GAS

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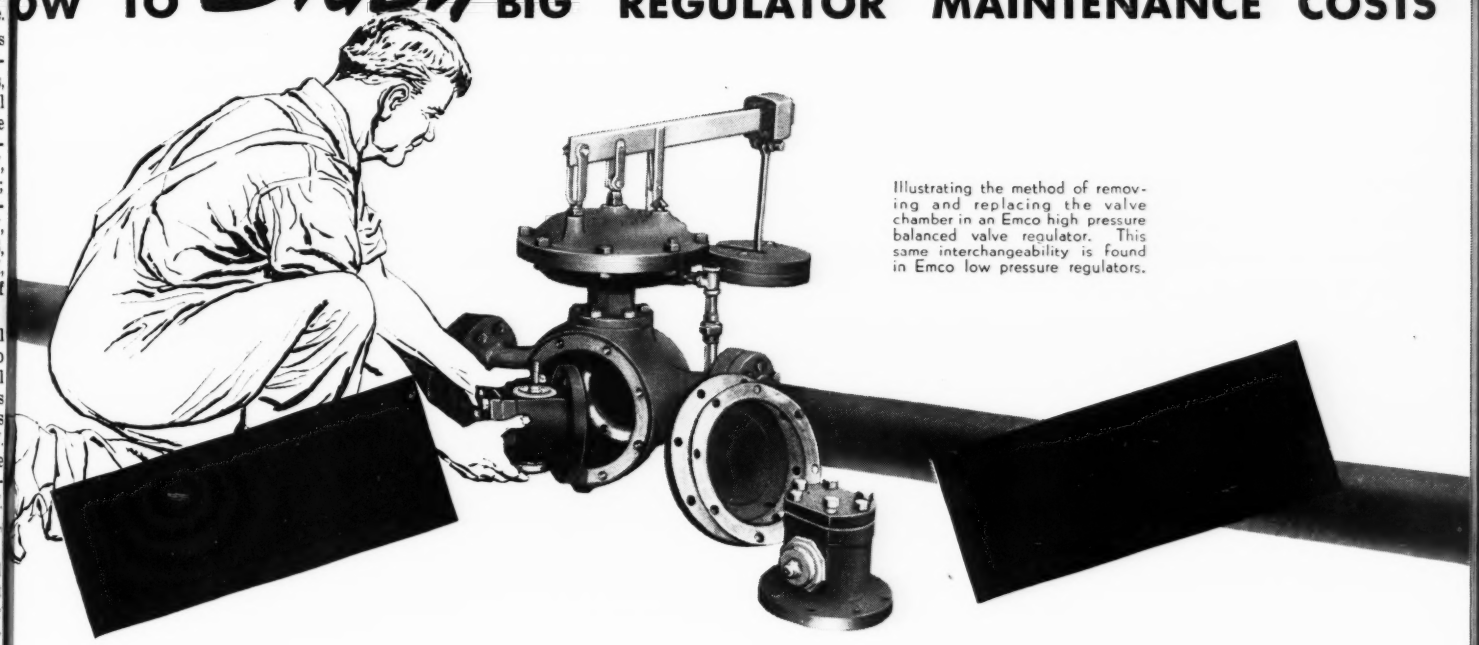
HOW TO *Slash* BIG REGULATOR MAINTENANCE COSTS



Illustrating the method of removing and replacing the valve chamber in an Emco high pressure balanced valve regulator. This same interchangeability is found in Emco low pressure regulators.

All Emco balanced valve regulators have the exclusive design feature that permits the valve chamber (inlet bowl assembly) to be replaced while the regulator remains in the line. Full access to this part is provided through a hand hole opening in the body. You simply remove the body plate, unbolt the present chamber, disconnect the valve stem and replace with a new or rebuilt chamber and valve assembly.

How quick, easy and economical. And here's a further advantage! All sizes of this valve chamber assembly are interchangeable. Hence the capacity of any regulator can be reduced by merely substituting a smaller valve chamber assembly in the same regulator body.

The removable and interchangeable valve chamber is but one of many advantages in the Emco design that result in lowered regulation costs. *Get the whole story by asking for bulletin* 1006.

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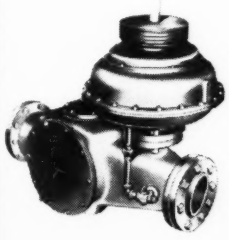
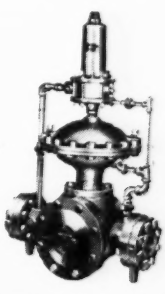
EMCO *balanced valve* REGULATORS



EMCO LOW PRESSURE BALANCED VALVE REGULATOR

Reduce inlet pressures of 150 psi or less to an outlet pressure range of from 2.5 psi to 1 oz. Made in sizes from 2-in. to 12-in. All Emco balanced valve regulators are designed for use on lines carrying manufactured, natural or LP-gas.



EMCO HIGH PRESSURE BALANCED VALVE REGULATOR
(Shown with Pilot Loading Control)

Standard type for reducing line pressures of 600 psi or less to any delivery pressure of from 2 to 300 psi. A special type will handle 1200 psi inlet and reduce to an outlet range of from 25 to 500 psi. Sizes 2-in. to 12-in.

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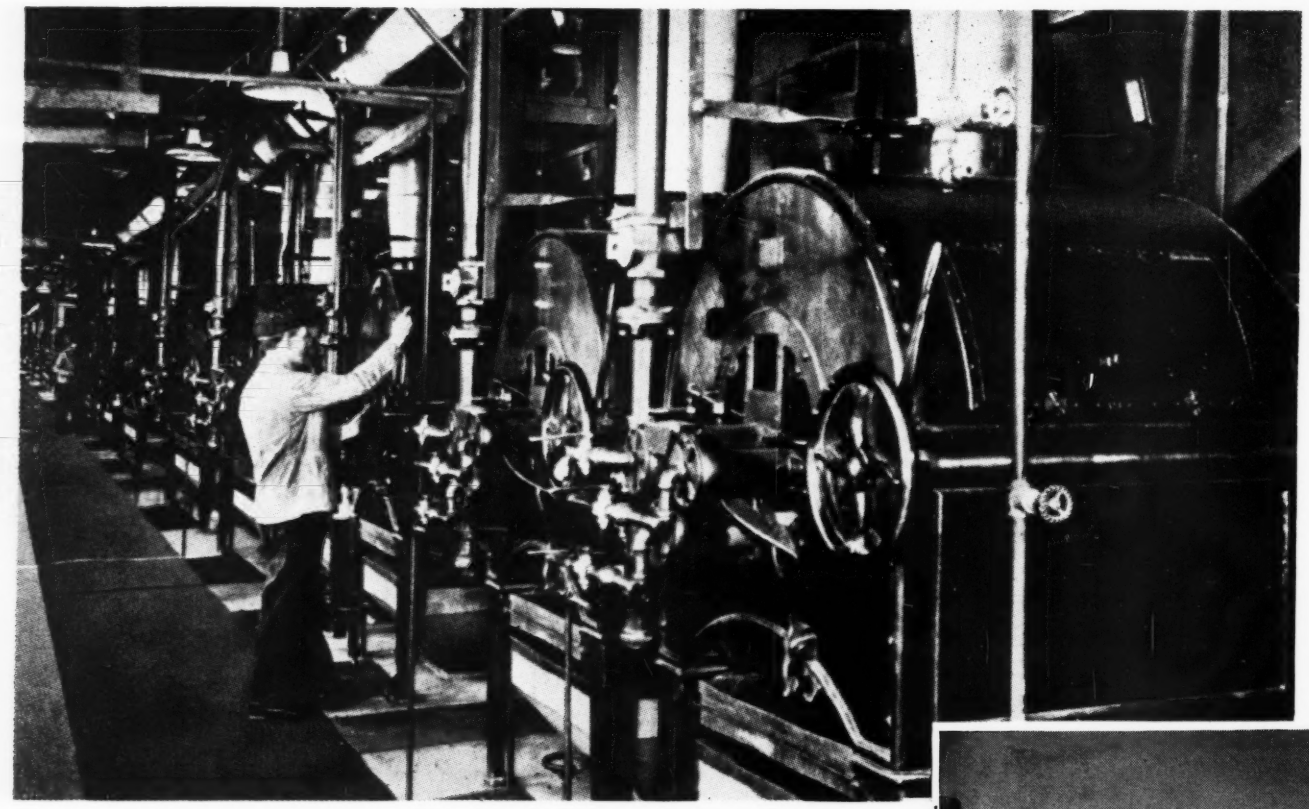

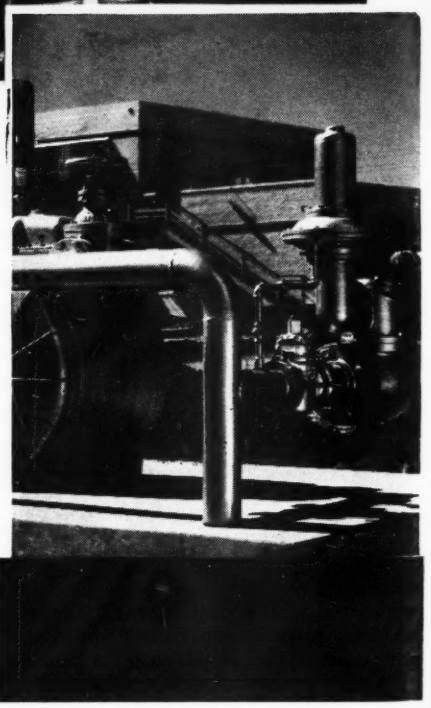

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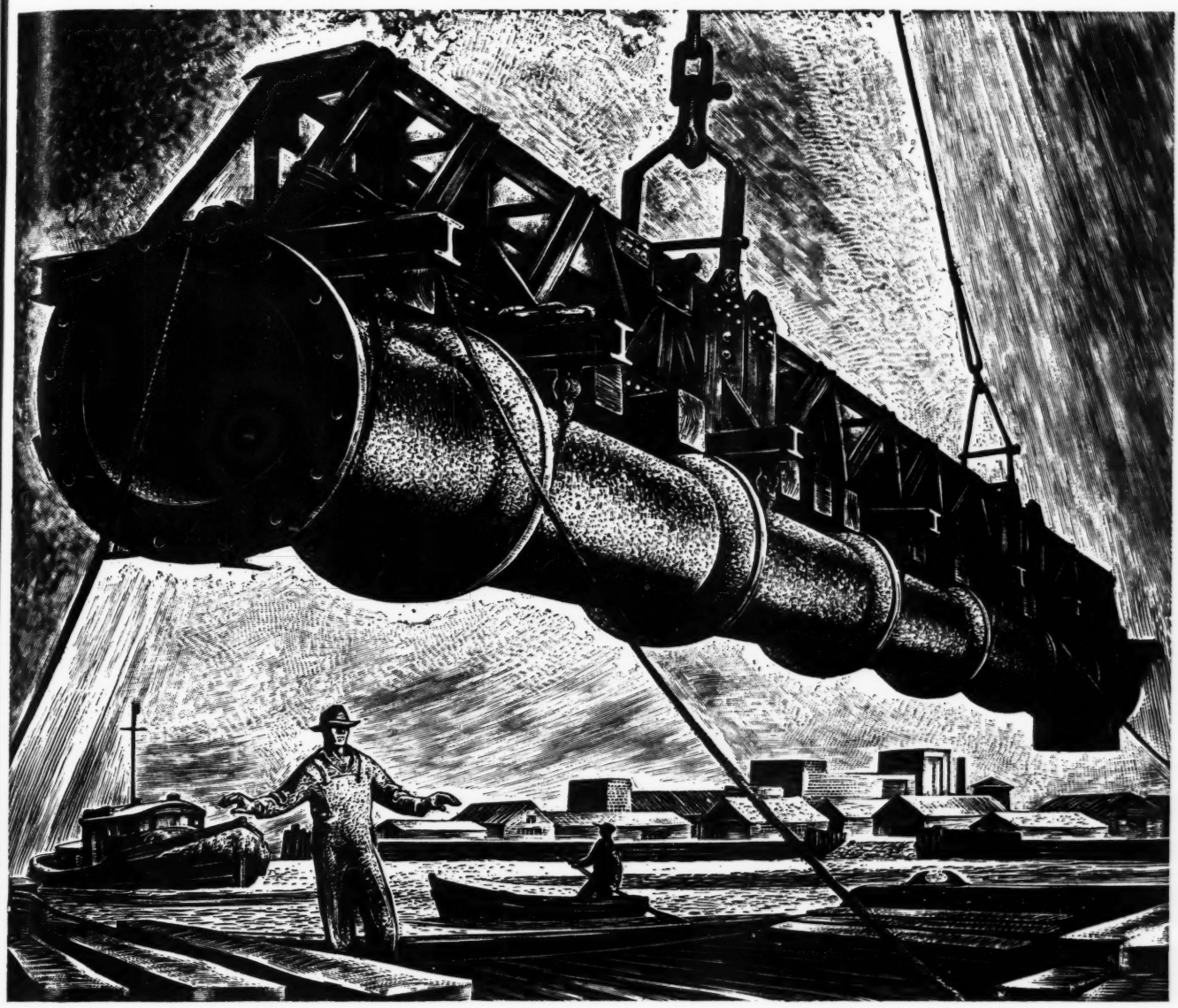

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Twenty-Third Year of Publication

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Highlights

GASOLINE EXTRACTION PLANT TO UTILIZE FLARE GAS. Seventy-thousand gallons of liquid hydrocarbons will be recovered daily from 17 MMcf of casinghead gas which is now being flared in Louisiana, when construction is completed on a gasoline extractor plant at Richland Parish. The plant will utilize flare gas from three large fields—Delhi, West Delhi, and Big Creek. After extraction, the remaining gas will be sold for fuel. Sun Oil is supervising the job of building the plant, which is owned by 16 producers.

BURTON BEHLING NOMINATION DELAYED. Although more than two months had passed since the President nominated Behling to the Federal Power Commission to succeed Richard Sachse, who had resigned because of ill health, in mid-July the Senate had as yet not confirmed the appointment. The delay stemmed from an argument between West Virginia's Revercomb, head of the Committee on Public Works, and White of Maine, chairman of the Committee on Interstate and Foreign Commerce, whose committee had jurisdiction over investigation of Behling's record.

BUREAU OF MINES DIRECTOR QUITS. Dr. R. R. Sayers has resigned his post in the Interior Department to return to the position of medical director of the Public Health Service. Pending appointment of a successor, Assistant Director Thomas H. Miller is acting director.

CALIFORNIA DEBATES POOLING GAS SUPPLY. The California Public Utilities Commission is carrying on an investigation of the state's gas supply and outlook with a view to planned utilization. A proposal being considered is combining the resources of Northern and Southern California, and cutting industrial users by 60%. Pacific Gas & Electric has opposed the plan on any but a temporary basis. J. S. Moulton, executive engineer, has expressed company opposition to construction of a line from Texas to bring gas to the northern part of the state. Replenishing fuel oil supplies is looked upon as the proper solution to the problem.

TENNESSEE GAS CHANGES NAME. Tennessee Gas and Trasmission Co. as incorporated under the laws of Tennessee has been dissolved. Henceforth it will be Tennessee Gas Transmission Co., of Delaware. TGT requested the change because of the "complex and uncertain" corporation laws in Tennessee.

MOORE-RIZLEY BILL PASSED THE HOUSE JULY 11. But time was running out, and experts took a dim view of its chances of getting past the Senate and the White House before the session ran out. It hit a snag in the Senate Committee on Interstate and Foreign Commerce. The portion of the House bill giving the Interstate Commerce Commission sole authority over a pipe line which serves as only a transportation agent was the bone of contention. Even if it was successfully rushed through, a pocket veto was deemed a certainty.

HEARINGS OPEN ON PERMANENT OPERATION OF BIG INCH. A long, tedious hearing was anticipated as the FPC took up Texas Eastern Transmission Corp.'s application early last month. More than 30 intervenors, including railroads and coal interests, Midwestern petitioners for a share of Inch gas, and competing pipe line companies claiming grandfather rights, promised to keep the case alive for many weeks.

THE SUPREME COURT HAS STIRRED UP ANOTHER HORNET'S NEST. On the heels of the Interstate case came the decision of the high court awarding right to submerged tidelands to the federal government. California and Texas were hopping mad, and the Interstate Compact Commissions and the various oil associations petitioned Congress to quitclaim the lands to the states. California was somewhat mollified by the signing of an agreement whereby: the three principal harbors were declared exempt; royalties by companies operating in tidelands will continue to be paid to the state, to be held in reserve pending settlement of ownership.

STORING NATURAL GAS IN LIQUID FORM. A new method which, it is claimed, will reduce storage space requirements "by nearly 100%" has been developed by L. F. Stutsman and George H. Brown, Northwestern University. The gas was liquefied by subjecting it to temperatures of —260° F and stored in refrigerated tanks.

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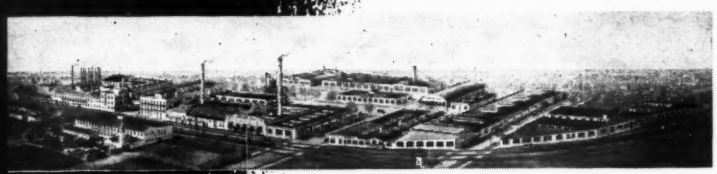

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TECHNICAL TRENDS

by Guy Corfield

Compressed Gases

THE Interstate Commerce Commission has changed, as of July 18, certain details of "Regulations for the Transportation of Explosives and Other Dangerous Articles." Under this heading comes compressed gases, and an amendment to the ICC Regulations gives new definitions that are of interest.

A *compressed* gas is defined as any material or mixture having in the container either an absolute pressure exceeding 40 psi at 70° F, or an absolute pressure exceeding 104 psi at 130° F, or both; or any liquid inflammable material having a Reid vapor pressure ("ASTM Method of Test for Vapor Pressure of Petroleum Products," D-323) exceeding 40 lb. psia at 100° F.

Any compressed gas as defined above shall be classed as *inflammable* if either (1) a mixture of 13% or less (by volume) with air forms an inflammable mixture, or (2) the inflammability range with air is greater that 12% regardless of the lower limit. These limits shall be determined at atmospheric temperature and pressure, by a method of sampling and test procedure acceptable to the Bureau of Explosives. The inflammability range is defined as the difference between the minimum and maximum percentage by volume of the material in mixture with air that forms an inflammable mixture.

War Department Research

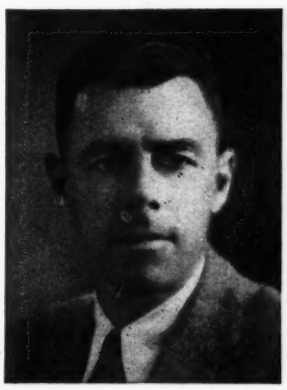
ALTHOUGH it is not directly related to the gas business, it is interesting to note what the House Appropriations Committee is providing and the War Department is undertaking in the way of technical research and development during the coming year.

Two hundred twenty-two million dollars has been appropriated with the statement that "the committee feels that a research program must be planned on a long-range basis, and that research money should flow evenly year after year in order to maintain the maximum results from the minimum of funds."

Included in this appropriation was authorization to continue the services of 18,201 civilian scientific and technical personnel, who will spend $50 million; also provision of $75,000 for expenses incidental to attendance at technical, professional, scientific and similar meetings and conclaves.

Fuel Gas Standards

WITH the current need for flexibility of operation, to make use of available raw materials and provide for peak load and other emergency gas, and also with the trend prevailing toward the use of LP-Gases for enrichment and of LP-Gas-air mixtures for straight substitution or conversion, production engineers are greatly tempted to send out gas that is most immediately convenient and economical without due regard to the problems presented to the utilization engineer and appliance manufacturer.



Particularly in LPG-air conversions, and in the smaller properties, there appears to be great lack of uniformity in the selected heating value of the LPG-air mixture, with the result that the utilization engineer and the manufacturer of existing appliances, and the manufacturer of new installations, are finding it quite difficult to adjust or design appliances.

While an amazing degree of flexibility can and is being incorporated into contemporary gas appliances, the limits are apparently being taxed rather severely in some instances, and it appears that the situation could be considerably simplified if some standardization could be worked out. It would seem that it would not be impossible to select a reasonable series of gas heating values, or, better perhaps, a reasonable series of "gas combustion characteristics" through the manufactured and mixed gas range, which in turn could be identified with a corresponding series of LP-Gas-air replacement mixtures. If such series could be considered and adopted as standards, it would give the manufacturer something on which to base his design, and the production and utilization engineer something for which they could plan.

Standardization

TWO technical professional standards have recently been developed, under the auspices of the American Standards Association, and are now presented for adoption in the interests of uniformity of terminology among technical workers.

A volume, "Standard Abbreviations for Use on Drawings" (2,000 in number), has been prepared by a national committee representing the American Institute of Electrical Engineers and the American Society of Mechanical Engineers. Copies of these abbreviations, ASA Z 32.13—1946, can be obtained from the American Standards Association, 70 E. 45th St., New York, N. Y., at a cost of $1.

The American Institute of Chemical Engineers, in cooperation with the American Standards Association, has prepared a set of symbols for use in chemical engineering calculations. A list of these symbols, "Letter Symbols for Chemical Engineering," ASA Z 10.12—1946, can be purchased from the American Institute of Chemical Engineers, 50 E. 41st St., New York, N. Y., at a cost of 50 cents.

In every engineer's experience, some difficulty and confusion has arisen because of lack of uniformity of symbols and terminology, and the preparation of these and other possible standards, which will no doubt be widely adopted, will be of great value to those working in technical fields.

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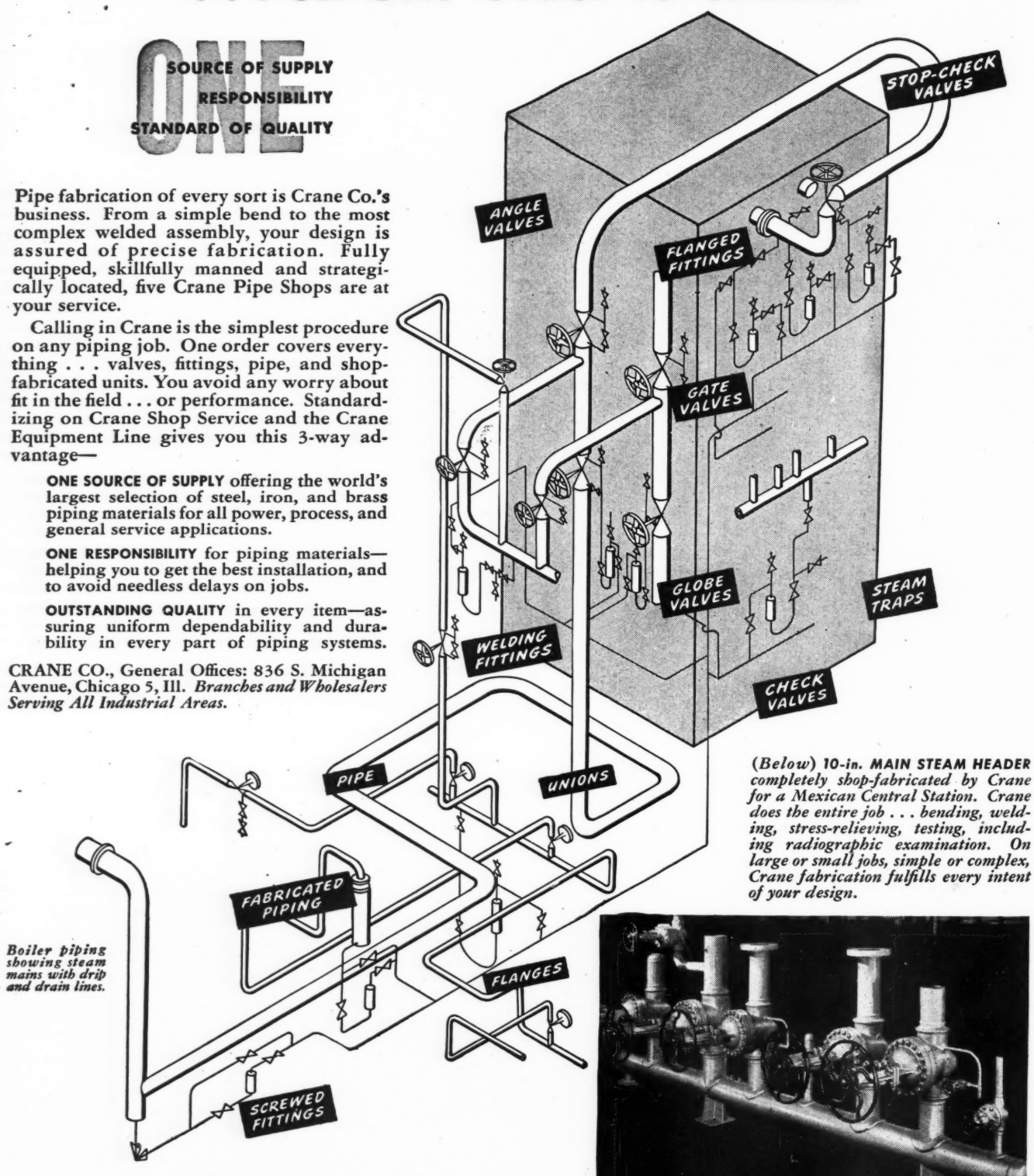
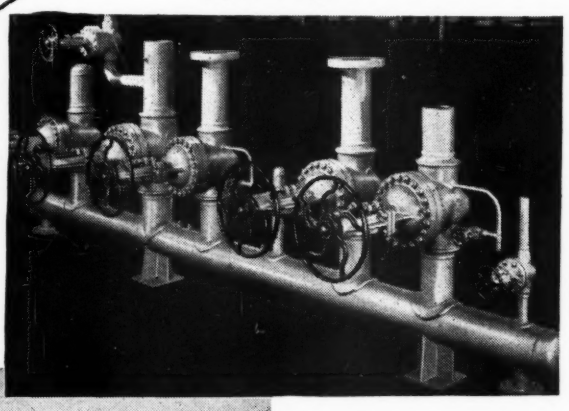


Boiler piping showing steam mains with drip and drain lines.

(Below) **10-in. MAIN STEAM HEADER** *completely shop-fabricated by Crane for a Mexican Central Station. Crane does the entire job . . . bending, welding, stress-relieving, testing, including radiographic examination. On large or small jobs, simple or complex, Crane fabrication fulfills every intent of your design.*



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PROMOTIONAL NOTES AND NOTIONS

by Stanley Jenks

Cooking for Cuties

AS a professional student of the current scene, I feel it my bounden duty to keep an eye on the national magazines, especially those aimed at the distaff side of the family. There is no purpose in bragging about the number of magazines giving deserving lads and lassies a higher education, but they are numerous. So many, in fact, that I cannot even name the one in which I saw listed four colorfully illustrated recipes that every bride ought to have at her fingertips. None of them has ever been on *our* family menu. How come? She who makes a house our home, and who is a skilled skilleteer in her own right, pointed out—emphatically, too—that these are no recipes for culinary tyros. They are tricky, depending on experience and the expert touch for success.

Of course, she and thousands of women like her do not yet appreciate that an automatic "CP" gas range takes most of the previous hazards and guesswork out of cooking. The real miracle in cooking today is not in the results, but in the "CP" gas range that makes cooking success inevitable.

Since the cooking load is our base residential load and the pillar supporting our incremental rate structures, there is no more important sales job confronting the gas industry than converting every cooking customer to a satisfied "CP" gas range user. The appliance dealers' help in this program is strongly recommended.

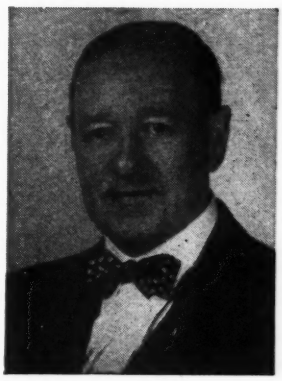
Gas for More Home Comfort

THE more self-contained a home is, the more the gas company stands to gain. We plug the "New Freedom Gas Kitchen" to induce the family to eat less often in restaurants and more often at home. The same can be said for refrigeration, home-heating, and automatic gas water-heating. The latter has a formidable competitor in the modern commercial laundry, and the No. 18 Blue Flame Bulletin of the A.G.A. Committee on National Advertising is very timely in reminding us of the better water-heating load factor of an automatic clothes washer, compared with the old-fashioned manual washing machine. The figure of about 40 more gallons of hot water needed weekly for a family of four with the automatic clothes washer is impressive and important if an automatic gas water heater provides the hot water.

But, did you ever stop to think that there are cases where the quality of water supplied by the water-works itself is driving our customers to the commercial laundries, which process out of the water those harmful ingredients making home laundering such a chore?

Hard water is the most common deterrent. Its disadvantages are so obvious that the water softener industry was created to combat it. However, there are other water pollutions that discourage home laundering.

Philadelphia housewives, for example, have always been plagued with dirty brown stains that often appear in the wash when soaps and bleaching powders are used.



Manganese in the water causes that stain. The manganese is in solution in the Schuykill river, a Philadelphia water source. The soaps and bleaching powder oxidize the soluble manganese into insoluble manganese dioxide and cause the stain.

This is one of the reasons Philadelphia is installing at its Belmont treating station the largest ozonation plant in the world. The ozone will oxidize the manganese ahead of filtration, and the filters will remove the manganese dioxide. Eventually, when all Phliadelphia's water supply is ozonated, another barrier to satisfactory home laundering will be removed.

(Incidentally, gas can be used to reactivate the air-drying ozonator auxiliaries—a substantial gas load in itself.)

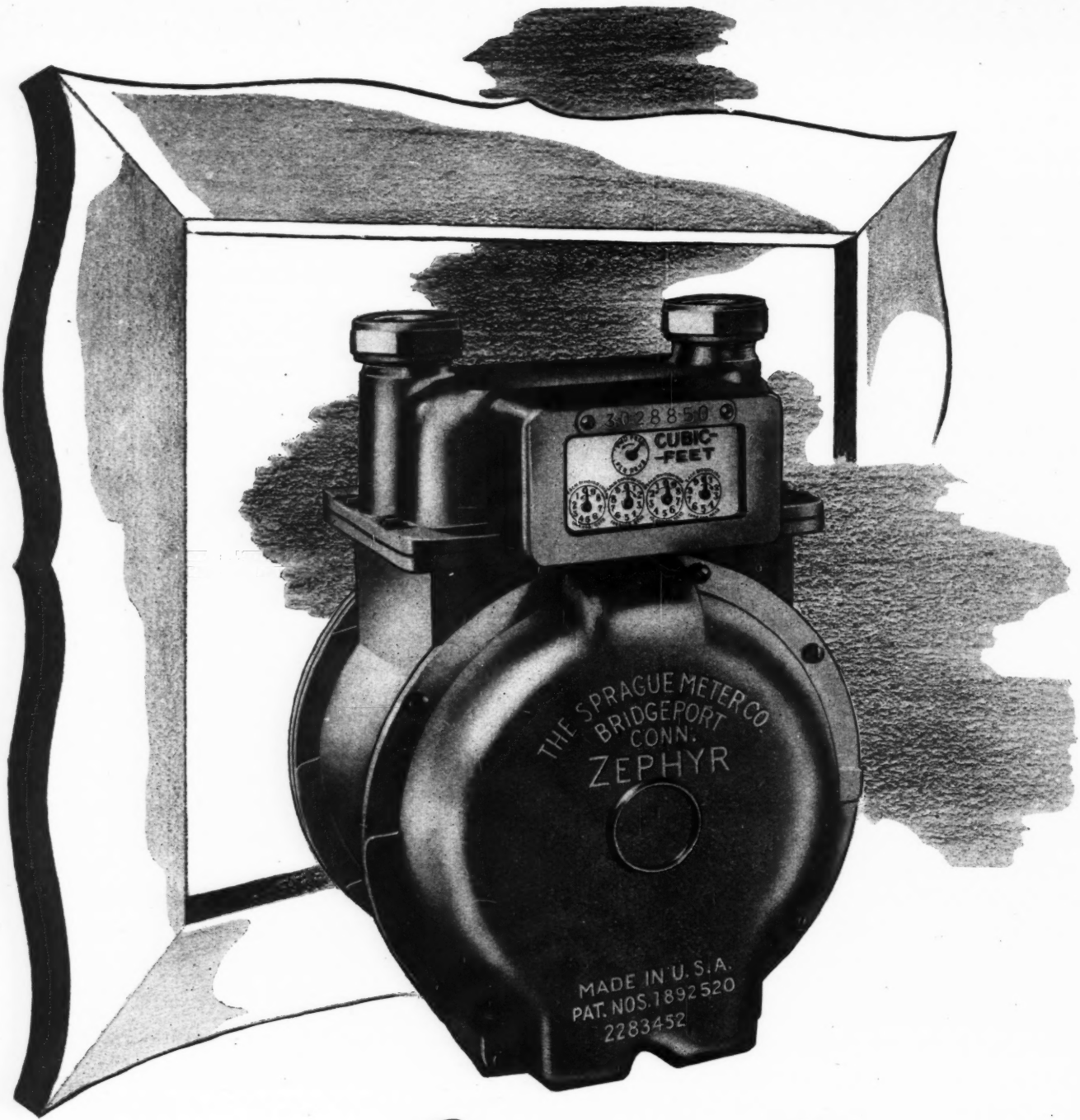
Load Dependency

NOW that the world—or our part of it anyway—is returning to some semblance of its pre-war methods of doing business, and we are able to sort out the temporary distortions, it is a logical assumption that some of our past conditions will again confront us. The main value of history is to keep us in perspective.

Therefore, re-reading an excellent paper entitled "Gas for New Homes," by Herbert G. Schaul, Westchester Lighting Company, delivered at the Mid-West Regional Gas Sales Conference in 1939, I found the following figures, compiled by Mr. Schaul from his own company records in Westchester County, N. Y. Mr. Schaul was illustrating the fact that central home-heating with gas protects and promotes other gas usages in the same home. Mr. Schaul reported he found:

Where gas was used for home-heating.....	100% gas for water-heating
Where gas was used for home-heating.....	99%+ gas for cooking
Where gas was used for home-heating.....	50% gas for refrigeration
Where oil was used for home-heating.....	99% gas for cooking
Where oil was used for home-heating.....	1% electric for cooking
Where oil was used for home-heating.....	80% electric for refrigeration
Where oil was used for home-heating.....	20% gas for refrigeration
Where oil was used for home-heating.....	90% oil for water-heating
Where oil was used for home-heating.....	10% gas for water-heating (Warm air jobs only.)

It would be interesting to see a similar study of the same territory today.



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The Sprague line of Zephyr meters offer the ultimate in accurate, dependable gas measurement. They are streamlined, light to handle, and economical to maintain. A complete line of these aluminum alloy meters can be had in capacities ranging from 175 to 1000 cubic feet per hour. Write for Bulletin 24A.

THE *Sprague Meter* COMPANY

BRIDGEPORT, CONNECTICUT

Peak Shaving With Propane-Air

Dedham and Hyde Park Gas Co. has injected propane-air into its gas since last January, using tailored equipment. Excellence of results is shown by the fact that to date only five customer complaints have been received.

By JAMES S. BARRY

General Manager
Dedham and Hyde Park Gas Co.

SINCE January of this year, when our propane-air plant was completed, to date the Dedham & Hyde Park Gas Co. has injected directly into the transmission main at the main governor station in Dedham varying amounts of propane-air of 817 Btu and of a gravity of 1.167, and has successfully mixed it with carbureted water gas of 540 Btu and a gravity of .72. The maximum amount injected during periods of heavy draw was 43% of the transmission line delivery from the Framingham plant 17 miles distant. The propane-air was used on 29 different occasions for periods ranging from ½ hour to 5½ hours. When the maximum amount of propane-air was injected, the mixed carbureted water gas had a 660 Btu content and a gravity of .91.

Exclusive

No extensive preliminary adjustment of customers' appliances was made. However, for six or seven months prior to the use of the propane-air, service men were instructed on routine burner adjustments to adjust the flame more on the soft side than on the hard side.

Only Five Complaints

During the entire period in which the propane-air was used, there was a total of five complaints on two occasions. The first time the propane-air was used and during the time that 43% of the propane-air was injected into the transmission line there was one complaint. This involved a gas range with star burners, in which the flame blew off the ports and the burners could not be relighted until the air shutters were adjusted. In the subsequent use of propane-air no further complaints were received from this particular range.

Five weeks intervened with no complaints, and then we received four complaints involving three gas ends with star burners in which the flame had a tendency to blow off the burners and the burners were very noisy, and a pilot on a gas range which would not stay lighted although the burners functioned satisfactorily. On the three gas ranges where the flame floated, the burners would remain lighted if a vessel was placed above the burners.

It was noted on this latter occasion (when the four complaints were received) that the star burner used as a test burner at the office, 1½ miles from the propane-air plant, had become very noisy, and when extinguished could be relighted only with some difficulty.

Test Burner Satisfactory

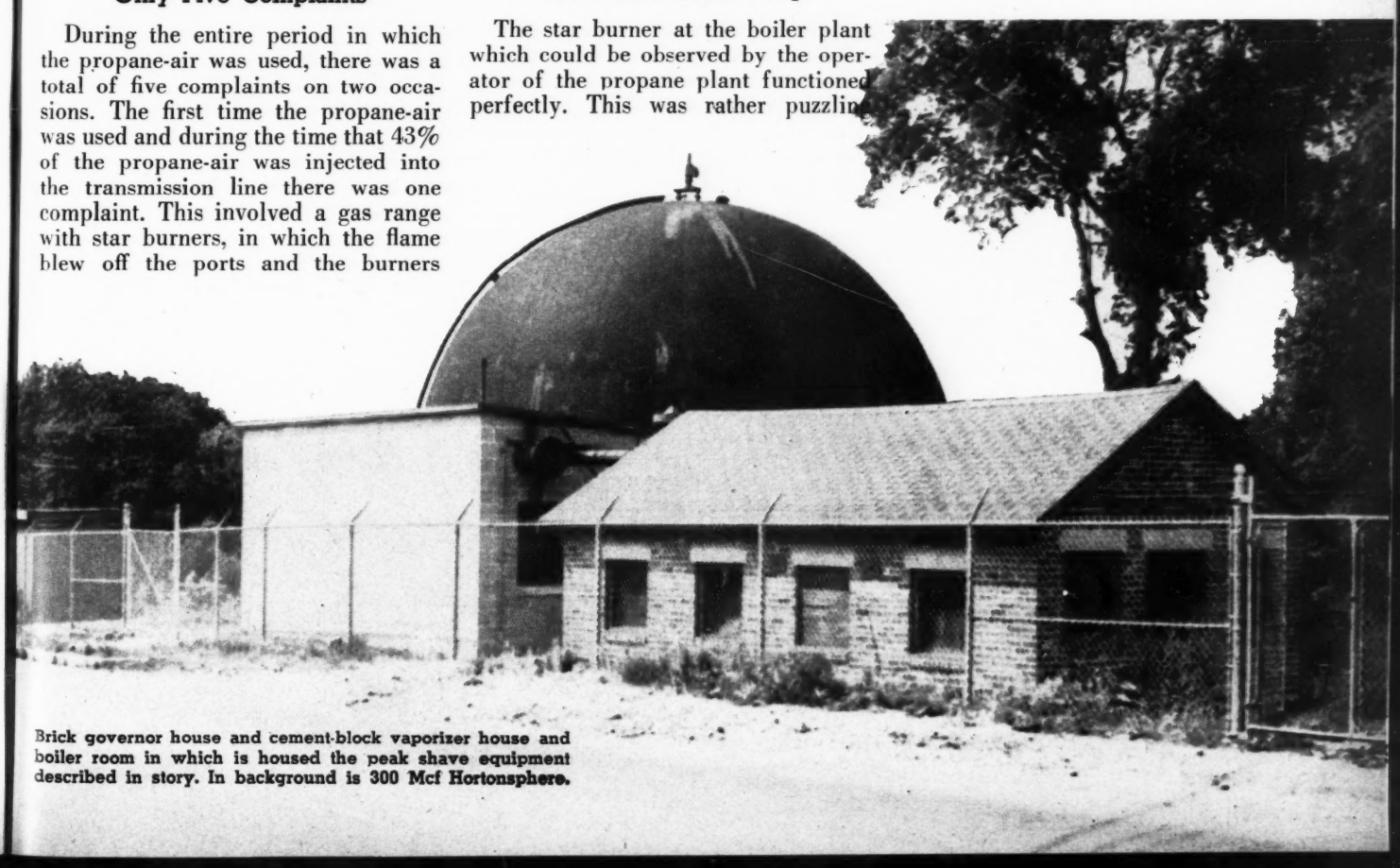
The star burner at the boiler plant which could be observed by the operator of the propane plant functioned perfectly. This was rather puzzling until it was realized that the 1-in. line from the end of the mixing pipe supplying this burner had originally been intended to supply four burners and hence, with one burner in operation, was not immediately responsive to changes in the blended propane-air and carbureted water gas.

Apart from the star burner range complaints previously mentioned, none of our 9200 customers, including 960 house and kitchen heating burner customers, experienced any inconvenience. The vast majority only knew that they were getting an adequate supply of gas at a time when they would ordinarily have very low pressure conditions.

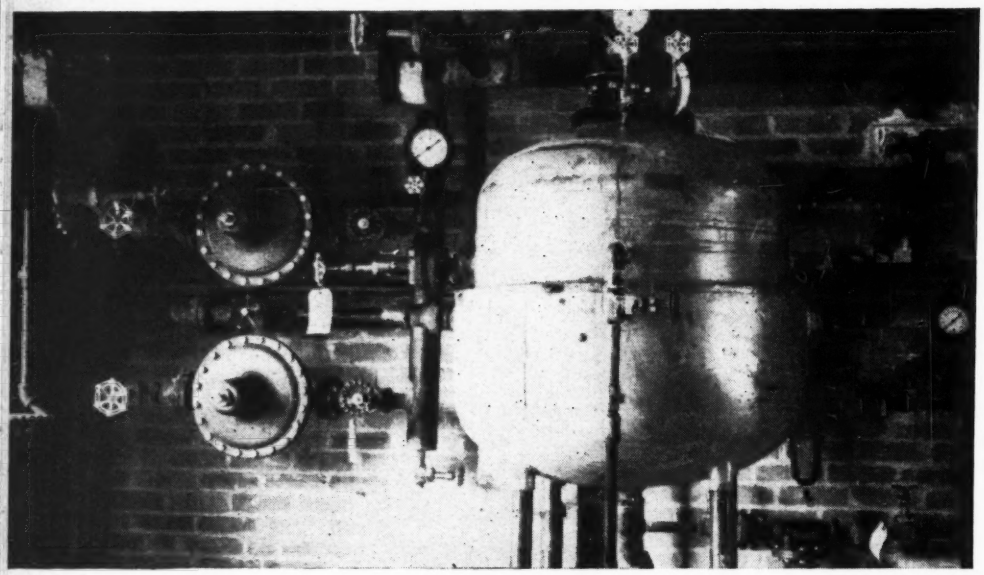
There were periods in which the allowable admission of propane-air to the line had to be supplemented by water gas stored in tanks in off-peak hours. The storage capacity of these tanks was 70 Mcf. With this increase in the base gas in the lines, the volume of propane-air could be increased by approximately 40% of the water gas released into the lines.

Why The Plant Was Needed

It might be interesting to know the circumstances that prompted our com-

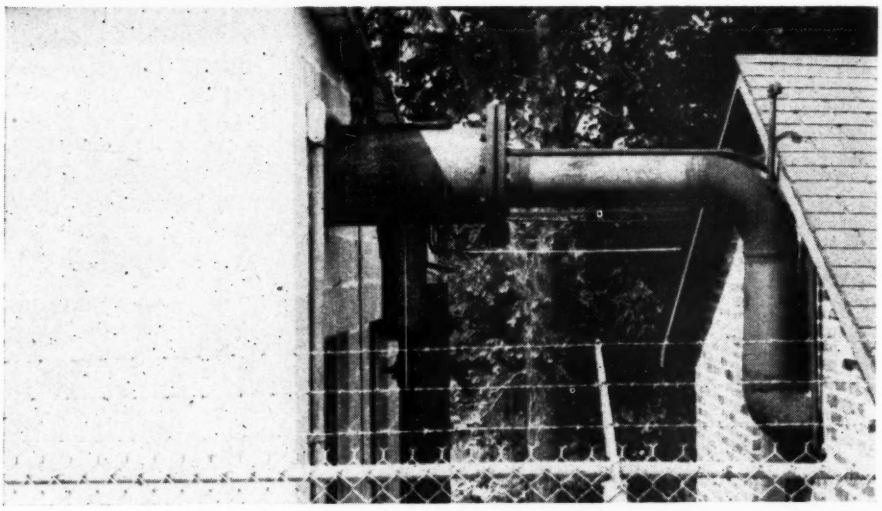


Brick governor house and cement-block vaporizer house and boiler room in which is housed the peak shave equipment described in story. In background is 300 Mcf Hortonsphere.



AT LEFT: The heat exchanger, with the first stage of vapor regulation, which reduces vapor from the heat exchanger to 25 lb. Also shown are inverted governors which reduce the inlet pressure of the propane liquid from storage pressure to 40 lb.

BELOW: 14-in. O.D. pipe extending from vapor house, and 8-in. connection to brick governor house. Flange on the end of 14-in. pipe permits withdrawing the baffle assembly.



pany to install the propane-air plant for peak shaving. During the winter of 1945-46, the tank storage of 70 Mcf proved entirely inadequate to supplement the line delivery from the Framingham plant 17 miles distant. On a number of occasions we were in distress, but on one cold Sunday in particular, with a 5½-hour peak, the transmission line pressure at the main governor station dropped to 1½ lb. from an initial pressure at the plant of 60 lb. The pressure at the office, which is used as a control point, dropped from 35 in. to 6 in. A large part of the Hyde Park area was without gas. The amount that could be bled from the tanks served only to narrow the area in which the pressure collapsed. In short, there was a widespread shortage of gas in the whole of the Hyde Park area.

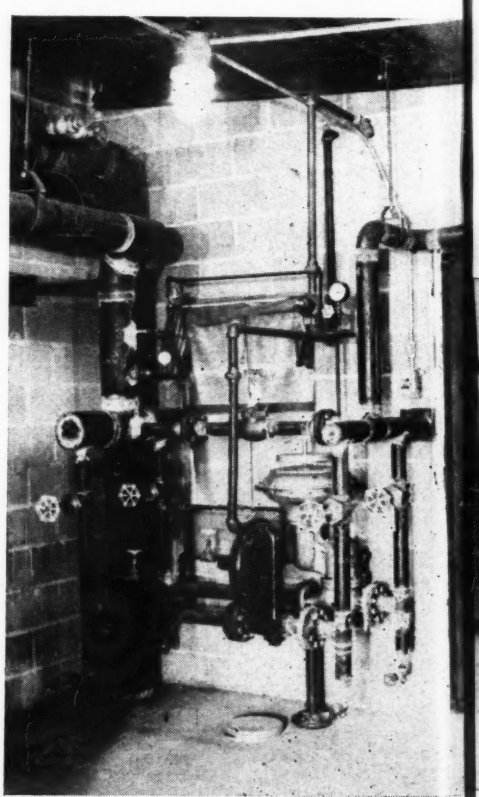
Our urgent need was additional gas storage. Arrangements were made to install a 300-Mcf Hortonsphere. The steel strike and others in the heavy industries made it evident in the early part of 1946 that the Hortonsphere would not be constructed in time to be placed in service for the winter of 1946-47.

With increasing gas loads and gas storage facilities that were wholly inadequate even for much less than the anticipated winter loads, our prospects were rather dismal. As none of the conventional types of storage tanks was available, our only choice was the installation of the propane-air plant. Through a fortunate series of circumstances the necessary storage and mixing facilities for the production of 50 Mcf per hour of propane-air of 800 Btu were made available.

Supervision

Under the guidance of Hall M. Henry of our organization, who had done considerable research on the use of propane-air for peak shaving, and under the supervision of the Phillips Petroleum engineers, the propane-air plant was planned and built.

AT RIGHT: Showing equipment for last stage of vapor regulation that reduces propane vapor to 6 in. before entrance to Selas zero governor.



From extensive tests on a variety of appliances conducted by Dr. Graves of Worcester Polytech, under the auspices of Worcester Gas Co., it had been established that mixtures of 40% butane-air of 800 Btu and 60% carbureted water gas would give satisfactory appliance performance if the gases were uniformly blended.

Hence, our propane-air was set at 800 Btu, leaving still the problem of how uniformly to blend the two gases in the transmission main. Mr. Henry, in the course of his research, has secured drawing of a layout used under similar circumstances by the Portland (Ore.) Gas Co. Our injection assembly and mixing pipe were adaptations

of the Portland scheme, and were a contributing factor in the excellent results obtained.

Construction

A 25-ft. x 25-ft. fireproof combination vaporizer house and boiler room was built on the side of a hill within three feet of a heavily traveled road and adjacent to the main governor house. A vapor-proof wall separated the vaporizer house from the boiler room.

The 8 in. transmission line delivering gas from the Framingham plant to the main governor house was bypassed, a new line passed through the vaporizer house, and new connections were made to the governors. This bypass line is 8 in., increased to 12 in. for five feet with two propane-air injector assemblies inserted inside the 12 in. section, and is then connected with 17 ft. of 14 in. mixing pipe with more than 60 baffles contained therein.

All gas delivered from the Framingham plant is diverted through this line, where the incoming gas entrains the propane-air as injected, and in the turbulence created in the baffled mixing pipe is blended uniformly. At the end of the mixing pipe a supply line is run around the building to a star burner in the boiler room. This burner can be seen from the vaporizer house through a double plate glass window installed in the vapor-proof wall separating the two rooms. From the observance of the characteristics of the flame of this burner, the operator of the propane-air plant can determine the effect on the customers' appliances of the amounts of propane-air that are being introduced to the distribution lines.

Operation

I might mention that during the winter months an attendant is stationed at the main governor house daily from 7 a. m. to 9 or 10 a. m., and from 4:30 p. m. to 7:30 p. m., and on Sundays from 8 a. m. to 2 p. m. From observance of the incoming transmission line pressure, the duration of a peak can easily be estimated. As the governors are by-passed when the inlet pressures drop below 5 lb., it is necessary to keep the attendant at the propane-air plant informed by telephone of pressure conditions at the control point (which in our case is the office, 1½ miles from the governor house).

The propane plant consists of one 30,000-gal. liquid propane tank connected to the vaporizer house with 60 ft. of 2-in. line. The storage tank is also connected through 525 ft. of 2-in. liquid and 1-in. vapor lines underground across a public highway to a leased railroad siding where a 5-hp Brunner Compressor is used to unload the propane from the railroad tank cars.

Equipment

The equipment within the vaporizer house includes two 8C Standard Philgas heat exchangers having a propane vaporizing capacity of 235 gal. each per hour at 518 lb. of steam per hour supplied by a McKee 15-lb. 3L boiler from boiler room; one stage of liquid regulation that controls the liquid pressure to the heat exchangers; and two stages of vapor regulation that reduce the pressure of the vapor from the heat exchangers to 6 in. At this latter pressure, the vapor enters the Selas Type L diluting unit which consists of an F-50510 Selas Turbo type combustion controller with a capacity of 50,000 fh of 800-Btu propane-air mixture at 5 lb. outlet pressure, complete with 40-hp explosion-proof motor.

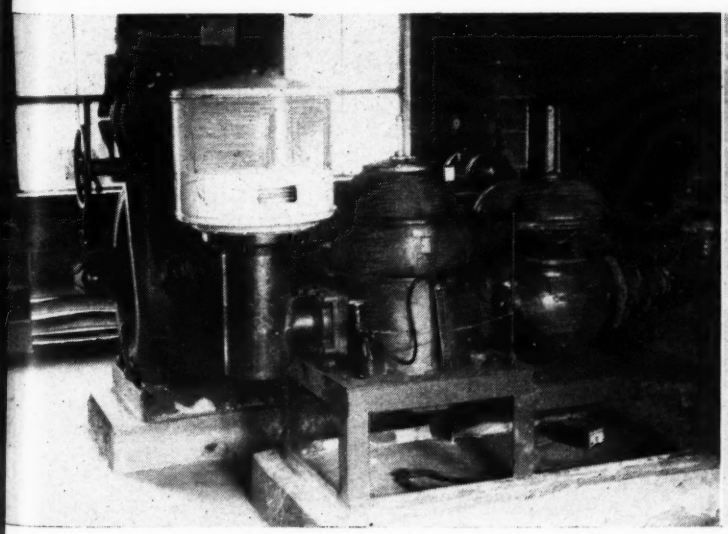
Drawings of the injector and pipe assemblies which were designed for the installation described in this story appear on the following page.

On the outlet of the Selas compressor a 6-in. gear-operated Merco Cock and a 6-in. check valve are installed. The 6-in. line is continued to the injector assemblies pipe where 2-in. and 3-in. connections with valves are made to injector assemblies.

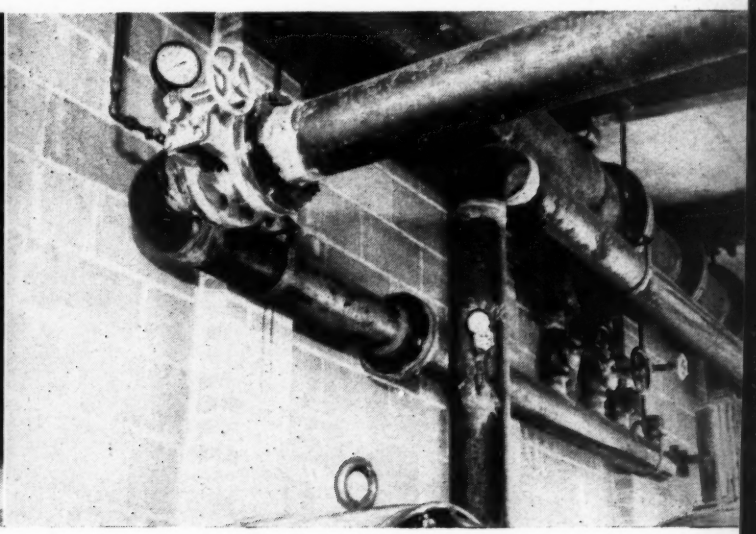
It is by manual operation of these 3-in. valves that the attendant introduces the propane-air while observing the flame characteristics of the test burners.

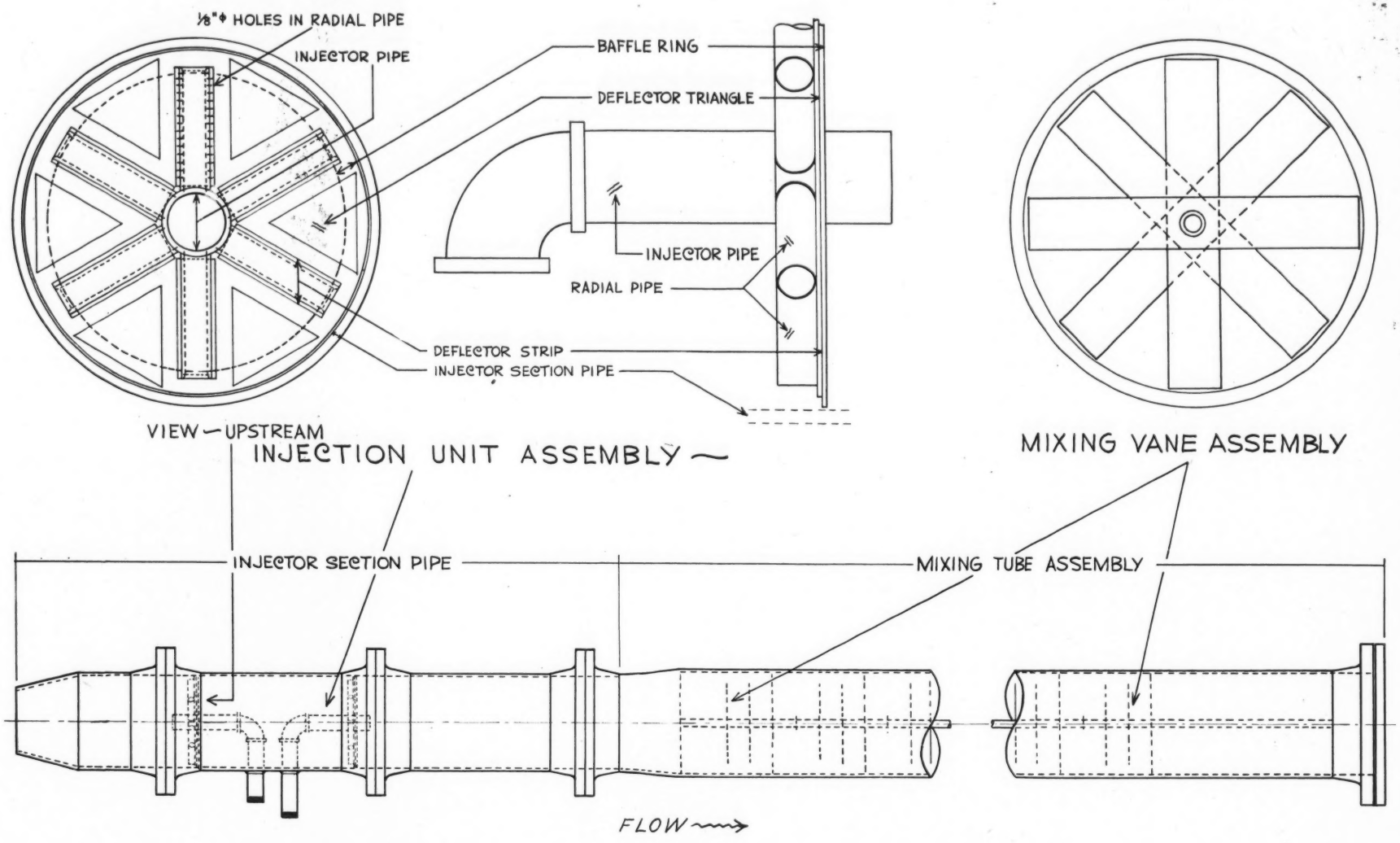
The setting of the orifices of the Selas mixer determines the ultimate Btu content of the propane-air mixture. The original setting of the mixer was made while burning off 3000 ft. of propane-air and checking the Btu with a Junker Calorimeter. There is no variation in the Btu, providing the differential pressure between the Selas governor and mixer does not exceed ¼-in. water column.

Selas zero governor and mixer with air filter. In right background in 6-in. Merco cock with gauges which show gas storage tank pressure and incoming gas pressure. Gas from storage is released through this 6-in. cock to the inlet side of the 12-in. injector pipe assembly. Gear operated Merco cock can be seen on outlet of compressor, beyond air filter to Selas mixer.



Uppermost pipe is the 12-in. flanged injector assembly, which is connected to the 14-in. O.D. baffle pipe. Verticle 6-in. pipe is the propane vapor inlet line to the Selas zero governor. The 6-in. line with blast gate continues along wall as shown, beneath 12-in. injector pipe assembly. Two 3-in. valve connections, manually operated, control amount of propane-air injected.





INJECTOR & MIXING PIPE ASSEMBLIES

TODAY AND TOMORROW

In Gas Manufacture

A review of the supply potential and economics of the several materials for gas making; and a report on status of current AGA research programs.

By EDWIN L. HALL

American Gas Association

THE materials that are commonly available for the production of gas are coal and coke, gas oil and heavy oils of the fuel oil class, LP-Gases and natural gas. One important gas-making material that is frequently overlooked in such a classification is steam, which is one of the important sources of hydrogen. Oxygen for gas making is currently being investigated and evaluated by many individuals and companies.

Manufactured gas production processes are concerned with the conversion of these raw materials into higher forms of energy, normally gas, tar and coke. Many gas engineers are convinced that this conversion should produce only gas as a by-product. Others are concerned with developing by-products of gasification processes that will help to carry the cost of the operation. Most of our present processes have an intermediate result between these two extremes.

Where ample supplies of natural gas are available, as is the case in a large part of the country, our manufacturing processes commonly disappear and the gas production problems become those of storage and recovery. This may involve underground storage of natural gas and the resultant question of recovery from underground storage for peak load, or storing and handling LP-Gases combined with vaporizing and mixing these gases with a carrier gas, normally air, for peak load periods.

During the past few years the domestic market for coke has been decreasing because of the trend toward automatic heat with either oil or gas. As a result few gas companies have been able to justify the installation of coal gas equipment. On the other hand, coke is not only a fuel but a primary chemical of the steel industry, and this industry has used and installed large coke-producing facilities. Where these coke ovens are installed it is frequently possible for gas companies to purchase surplus coke oven gas at attractive figures. This practice will probably continue at favorable locations.

Supply

When studying the national fuel picture one must first consider the total amount of fuel that is potentially available. Dr. A. C. Fieldner of the U. S. Bureau of Mines has recently given an excellent picture of the national fuel reserves. (1) "Excluding fissionable material, coal comprises 98.8% of our mineral fuel energy reserves, oil shale amounts to 0.8%, petroleum to 0.2% and natural gas to 0.2%. It should be noted that the Bureau of Mines distinguishes between coal reserves and proved reserves of natural gas and oil. The proved reserves of fluid fuels are increased each year by discoveries and extensions of existing fields. The solid fuel reserves are estimated from geological observations, and while no great accuracy is claimed for the estimates future exploration might decrease rather than increase these reserves.

"At the present rate of consumption coal may be estimated to last for 2600 years, oil for 12 years, oil from shale for 54 years at the present rate of total oil use, and natural gas might last for 34 years."

It is evident that the total reserves have little relation to the current supply and the price of fuels. There never seems to be more than a 20-year supply of oil, and ever since I can remember the supply of natural gas has been increasing, but the 34-year figure quoted by Dr. Fieldner is next to the largest that I have seen. The largest figure was 50 years, in an article published since Dr. Fieldner's estimate.

Before these fuel reserves become useful they must be recovered from the ground, shipped to their destination and, in many cases, refined or treated in some other way.

In 1934 bituminous coal, f.o.b. New York Harbor, cost about $5 per net ton. This price held relatively constant until about 1940. Since 1940 a succession of coal strikes and increases in freight rates have gradually increased this price until the present delivery price in New York is about $7 per net ton. In 1934 the price of Bunker C oil was $1.24 a barrel and the price fluctuated from this level to as low as $1.04 a barrel in 1938-1939. Since 1939 the price has gradually increased until it is now quoted at $2.22 a barrel, f.o.b. New York Harbor, or slightly more than 5 cents per gal.

3½ to 1

Considering handling costs, freedom from ash and other auxiliary advantages that may be credited to oil, it is the usual practice to compare 3½ barrels of oil with one ton of coal. On this basis of comparison Bunker C oil was valued at about 50 cents to $1.50 less than coal per equivalent ton until about 1943. Since 1943 the shortage of coal has induced many industries to convert from coal to heavy oil for fuel purposes and as a result there has been insufficient oil for all demands. The tremendous demands for oil during the war would have been expected, at first thought, to have caused a shortage in the supply of Bunker C oils. Actually, these oils have been in poor supply since the war rather than during the war.

The increased demand for heavy fuel oil has been caused by three particular factors: first, American industrial production has been at a very high rate; second, continued interruptions in coal mining have caused many industries to change from coal to oil firing; third, shortage of gas for industrial fuel in certain areas has caused some industries to install standby oil facilities.

Mr. J. W. Connolly, (2) in an article entitled "Cooperating For The Future," says: "The demand for petroleum fuels is now at an all-time high, and although we can say that there will be plenty of oil for all users,

[1] "The National Fuel Reserves" presented at the Annual Meeting of The American Society of Mechanical Engineers, Dec. 26, 1946.

Presented at Pennsylvania Gas Association Convention, May 21.

[2] Head of Marketing Counsel Dept., Standard Oil Co. (N. J.). This is a paper presented to OHI Convention at Atlantic City. From reprint, "Fueloil & Oil Heat" April 1947, p. 63.

oil cannot be pumped from the wells directly into the consumers' tanks.

"The industry is doing all in its power to bridge this gap as rapidly as possible. We are building new refineries, laying new pipe lines, developing new crude resources, but it will be two or three years before the full results of present expansion will be felt in the market.

"The short term demand for oil products will be somewhat hard to meet. Immediate demand has grown faster than postwar facilities, and while the oil industry should be able to supply the amount of refined products which it will be called upon to furnish, the job will call for the cooperation of every person in the industry."

Residual Oils Decrease

Mr. Connolly goes on to describe the sky-rocketing demand for kerosene and the continued demand for No. 2 fuel oil. He points out that developments in refinery techniques, and particularly in catalytic cracking, have made it possible to obtain more and more gasoline and middle fractions from a barrel of crude oil. As a result there is a reduction in the amount of residual or heavy fuel oil. He estimates that the present yield of residual fuel oil is about 25% on crude and believes that it may go below 20% in the next 10 years. However, he expects domestic residual supplies to be supplemented in the future by imports of heavy fuel from foreign refineries, and an increased production of No. 5 fuel oil.

All of this probably means that the situation wherein low prices of heavy oils obtain will not soon recur, and that we may expect to pay about the same price for residual oil that we pay for bituminous coal.

The above remarks do not apply to certain premium fuels such as gas oil, natural gas or liquefied petroleum gases. These gas-making materials are still in competition with coal and coke but, due to their cleanness, volatility and other physical and chemical properties, they normally command some premium price.

Character of Fuel

All of the fuels that we commonly use are composed principally of carbon and hydrogen. Sulfur, oxygen, nitrogen, ash, etc., are present in greater or smaller amounts and are normally considered to be impurities.

As raw materials for the production of gas the common fuels vary from methane to anthracite coal or coke. Methane contains 25 units of hydrogen and 75 units of carbon. Anthracite coal contains three units of hydrogen and 94 units of carbon. An intermediate fuel such as 18.7° Be oil contains about 12 units of hydrogen and 86 units of carbon. The direct production of 25 units of hydrogen by cracking will then require the utilization of 75 units of carbon from methane, 175 units of carbon from fuel oil or 375 units of carbon from an oil tar that contains only six units of hydrogen.

All of our present gas-making processes may be divided into one of two fundamental methods. First is the cracking process, in which the hydrogen and some of the associated carbon is distilled and cracked to gases and vapors, leaving behind a carbon residue. Examples of this process are coal or coke-oven gas processes, oil-gas processes where the residual carbon is used as fuel or removed and marketed as lampblack; the carburetted process for water gas where most of the carbon is used as fuel, and the reformed gas process where the carbon is first deposited and later used as blue gas or producer gas fuel.

The second process is the well known blue-gas process, in which steam is reacted with hot carbon to form hydrogen and carbon monoxide.

Combinations of these two processes may vary from the practice of steaming vertical retorts to catalytic cracking of hydrocarbon gases. When steaming vertical retorts, blue gas represents a small proportion of the total gas made. In the catalytic reforming process, the blue gas reaction must be almost simultaneous with the cracking reaction if carbon deposition is to be avoided.

Research Programs

The Gas Production Research Committee and the Technical Advisory Committee of the American Gas Association, together with the various subcommittees that have been formed to direct the course of the association's research, have recognized that they are operating in an economic condition that is not fixed, and in very fluid, changeable times. These changes will not only be governed by long-time economic trends but will be reflected in temporary shortages of one fuel or another from time to time. Research projects can rarely be based upon either the cost or the supply of any specific raw material, but as the committees work on the various problems it becomes increasingly apparent that more knowledge of one problem will contribute to the solution of many projects. It becomes evident that research projects are not independent but interdependent. The more extensive the research work the better the chance of using a variety of raw materials. Some of the projects that I will discuss are laboratory projects of a fundamental nature, and information obtained from this work contributes to the development of pilot and plant scale tests.

Water Gas Reaction. Current projects on the fundamentals of the water gas reaction are under way at Battelle Memorial Institute and the Institute of Gas Technology. At Battelle Memorial Institute the work is at atmospheric pressure with a small 1 sq. ft. water gas set. The results of this work have been useful in analyzing proposed processes and in developing a better understanding of the unknown factors that must be answered before we completely understand this and similar processes. A parallel project at the Institute of Gas Technology is designed to investigate the reactions between steam, oxygen and carbon. To date this project has been operated at atmospheric pressure in order to obtain data for a pressure reactor designed to operate at 30 atmospheres. It is scheduled for delivery in the immediate future. Calculations have been made for the equilibrium conditions that may be approached when these reactions are carried out at pressures up to 30 atmospheres and temperatures above 2000°F. This work will aid in the analyses of processes such as the Lurgi Gasification Process and will contribute to investigations of the catalytic cracking of hydrocarbon gases and the development of fluidization cycles or processes.

Catalytic Cracking of Hydrocarbons. The Institute of Gas Technology has investigated commercial processes for the production of hydrogen from hydrocarbon gases such as natural gas, propane or butane. Laboratory tests further to develop catalysts for the cracking and blue gas reactions have been made. In industry the CO produced is converted to hydrogen, but we do not need to make this conversion. The preliminary work was most encouraging and a small pilot unit has been purchased and installed in the Tighlman Street plant of the Philadelphia Electric Co. at Chester, Pa. Preliminary operation of this pilot unit has indicated that we can produce a gas of almost any desired thermal value and specific gravity when operating with natural gas or liquefied petroleum gases. It is estimated that the unit will require in the order of 5.4 gal. of propane per Mcf of 530-Btu gas, or 10.6 gal. of propane per Mcf of 1000-Btu gas. In addition to the propane requirements, about 50 lb. of steam per Mcf of the cracked gas and about 200,000 Btu's of furnace fuel per Mcf of cracked gas will be required. The cracked gas will be of

275 to 325 Btu, depending upon the amount of air used for gravity control, and the fuel figures will vary slightly as the operation is modified.

Recent estimates for commercial plants of this type have indicated a general cost, exclusive of foundations and storage facilities, of about 50 to 75 dollars per Mcf of daily capacity. These general figures cannot be applied to any specific location but they do indicate the order of magnitude of these plant costs.

In developing this process we have not thought of these plants as substitutes for central station gas production plants but believe that in some locations they will serve as stand-by plants at the end of long transmission lines where they can be used to generate gas under peak load conditions or at times when pipe line troubles might cause service interruptions.

Sulfur Resistant Catalysts. Some of the raw materials that have been considered for the catalytic reforming process or for other processes contain sulfur compounds that poison the usual commercial catalyst. There is a current project for the investigation of sulfur resistant catalysts. Some progress has been made on this project and we are encouraged to believe that some of these catalysts may be used in the catalytic reforming process if refinery oil gas or some of the heavier sulfur containing naphthas are used in the process.

Fluidization Processes. Several modfications of fluidization cycles have been investigated at the Institute of Gas Technology. We have at the institute a current project for the development of fundamental information about materials that can be used in a fluidization process for gas production. As used by the oil companies the fluid catalytic process operates at temperatures that will give maximum recovery of gasoline and other liquid hydrocarbons. The problem is to operate a similar cycle at higher temperatures for the gasification of coal or oil. In studying this fluidization problem the information developed about refractory materials will be useful when considering catalyst supports for catalytic cracking. A better understanding of the fundamentals of the blue gas reaction will aid in producing conditions for the combustion of carbon or the generation of blue gas in the fluidization process. It is also possible that the catalytic cracking of hydrocarbons might be conducted in a fluidized bed rather than a tubular catalyst chamber.

As I have said, these processes are all related and as information accumulates on one project this knowledge contributes to the analysis of another problem.

High Btu Gas

While no one can foresee the exact future condition of the oil market, it must be recognized that our industry will be in an improved position if the lowest priced fuels that are available can be used, or if inferior fuels can be processed when it is difficult to obtain good fuels. The installation of fluid catalytic cracking processes for gasoline production reduces the amount of residual or heavy fuel oils that are produced from a gallon of crude oil, but at the same time all of the other products become more aromatic in character and tend to deposit more carbon when cracked for gas production.

Processes for the production of a high-Btu gas from gas oils of low carbon content have been developed in a number of places, usually as a means of making a substitute natural gas for peak loads. Many of our manufactured gas plants are limited in their oil cracking capacity and would welcome additional carburetting capacity that did not require the use of premium fuels.

Low Cost Oil

The Gas Production Research Committee has recognized this condition and has authorized the plant scale test of a regenerative cycle for the production of high-Btu gas from high coke oils. This test will be made at Baltimore on two 11-ft. sets that will be remodelled into one four-shell regenerative apparatus. It is hoped that some of these tests will be completed this fall or summer, but it may be next summer before the work is completed. If successful, this process, or modifications thereof, will afford a means of using low cost oils for the production of high Btu gas that can be used for natural gas stand-by or that may be used to augment the carburetting capacity of existing water gas plants.

Some companies visualize using such a high-Btu process for the production of city gas of about 1000 Btu. By this means they can double the capacity of existing services, mains, holders and auxiliary plant equipment. Preliminary studies indicate that the problem of changing from manufactured gas of about 530 Btu to this high Btu oil gas would not be as severe as a change-over to natural gas. Studies are not completed but they tend to show that many burners that would be unsatisfactory for natural gas can be used with this high-Btu oil gas, and that a changeover would normally require a simple change of spud and air shutter adjustment.

In developing this process more information about the reaction between carbon and steam can be applied and knowledge regarding refractories for use in the fluidization process will be useful in selecting refractories for this process.

Mixed Gas

Before present processes or any new processes can be evaluated we must know that the gas produced can be used on our customers' appliances. In most cases the new gas must be mixed with existing supplies and the problem is resolved into a mixed gas problem. More and more of our customers are using automatic appliances that no longer depend upon manual adjustment of a manifold valve to a star burner. This problem has become increasingly important within the past few years.

The American Gas Association conducted a rather complete mixed gas study back in the early 1930's, but the development of heavy oil and reforming processes and the use of blow run and other operating modifications has resulted in the production of gas that frequently falls outside the limits of the former study. This mixed gas problem is being analyzed and studied at our Cleveland Laboratories. This investigation is most important to the industry because it will aid in the selection of the most economical operating conditions for the various loads imposed upon our system. Interest in this problem is widespread. The complications of the problem are apparent because, each time suggestions are requested regarding means and methods for simplifying the problem, it is found that rather than eliminating some phase of the work new and different gas combinations are suggested.

By-Products

The possibilities of by-product production from gas plant operations are almost limitless but almost all plants produce water gas tar as the principal by-product. This by-product will only become more valuable when and if we have a better understanding of how it may be used in present or future markets. A study of the properties of water gas tar is under way at Pennsylvania State College. This investigation has already indicated that ordinary tar handling and dehydrating equipment will polymerize many of the light oil constituents of the tar. Further investigations should indicate potential recoveries of valuable fractions in this crude by-product.

Oxygen

The development of the Linde-Fran-

kel cycle for oxygen production has stimulated interest in the use of oxygen for gas production. Studies have indicated that the installation of relatively expensive oxygen plants for use with our existing equipment or processes probably cannot be justified. Estimates of the cost of oxygen production show costs as low as 11 cents per Mcf for large plants where the power is charged to the oxygen, and 5 cents per Mcf where no charge is made for energy for oxygen production. These present Mcf costs are low but require substantial investments in a plant which would require a load factor of 100% to meet the figures given above, and in some cases no spare equipment is provided in these estimates.

Perhaps we should not be surprised that existing equipment is not suitable for using oxygen, but this does not mean that oxygen cannot be used in other forms of equipment that are designed to use it with solid or fluid fuels. It is true that the use of oxygen will tend toward the production of maximum quantities of carbon monoxide if the gas made is a synthesis gas that contains only a trace of hydrocarbons. This carbon monoxide with steam and catalysts can be converted to hydrogen and carbon dioxide in well-known processes, and the carbon dioxide can then be removed from the gas.

Methanation

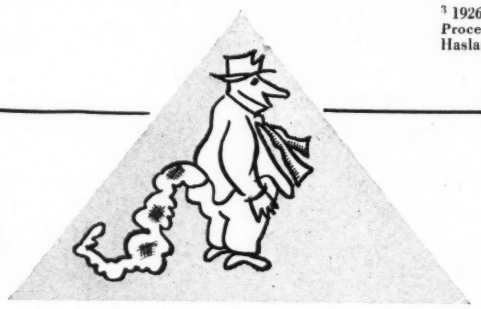
Recent publications from Hydrocarbon Research and the Pittsburgh Consolidation Coal Co. about the production of hydrocarbon gases and liquids from coal have been most stimulating and inspiring to everyone in the gas business.

The chemical details of the production of synthesis gas from coal or coke and the conversion of this hydrogen and carbon monoxide to hydrocarbon fluids has long been known.[3] An economic approach has eluded most workers. With natural gas valued at 23 cents per Mcf, and with 100 lb. of coal and 600 to 1000 cu. ft. of oxygen required to produce the four Mcf of synthesis gas needed to make one Mcf of methane, it was easy to figure that the coal would have to be mined, gasified and converted for $4.60 per net ton. Blue gas has been one of the most expensive gases produced by our industry, and it has seemed most difficult to reconcile these figures.

We must remember, however, that the natural gas price is very low, and that other fluid hydrocarbons such as gasoline are also sold at very low prices on our markets.

A change in relative fuel costs that would raise these hydrocarbon prices to a level that would be much higher but still well within range of their apparent value; a new method of recovering coal and gasifying it; and the application of well-developed techniques of modified Fischer-Tropsch synthesis for the production of hydrocarbon from CO and H_2, would make the British term for mining coal —"winning coal" — truly descriptive.

[3] 1926 Report of Chemical Committee, AGA. "New Processes of Interest to the Gas Industry." R. T. Haslam.



Safety Briefs

COMPRESSOR STATIONS

1. Do not smoke within compressor station enclosure.
2. Do not remove guards without permission of immediate supervisor.
3. Replace all guards before putting a machine or engine in operation.
4. Wear goggles when cleaning spark plugs, grinding on emery wheel, using wire brush, cleaning machinery with compressed air, or when welding or helping welder.
5. Do not try to make repairs or adjustments to machine parts that are in motion.
6. Do not carry flowing wiping-rags in pockets or wear flowing neckties. Keep shirts securely tucked into trousers.
7. Use safety spark plug tester for testing ignition system. A spark is dangerous.
8. Use copper hammer when use of a hammer is necessary in making repairs where gas may be present.
9. Protect electric lights by vapor pressure globes at all times.
10. Never under any circumstances use other than specification fuses on any electric circuit. Bridging of fuses or other over-load type of current interrupters is prohibited.
11. Provide extension lights with rubber-covered or other type of weatherproof socket, with adequate guard over globe.
12. Do not pile material in front of fire extinguisher stations.
13. In loading a compressor, always check discharge valve to be sure it is open.
14. Keep all floor space free from oil or grease and keep lockers in such condition as not to create a fire hazard.
15. Keep tools and spare parts clean and in the proper place. Do not use worn or defective tools; report such immediately to supervisor.
16. Check safety stop plungers in fly wheels at least once every six months.
17. Block piston rod securely before working on any internal part of engine.
18. Do not allow compressor piston rod to ride on packing gland; friction caused by a riding rod can produce a spark and cause an explosion.
19. Always use soap suds applied with a brush to detect leaks. Never use an open flame.
20. Set pop valves to pop at 10 lb. above allowable working pressure.
21. Open the indicator cock to relieve compression before removing a spark plug.
22. Always place "Danger Sign" on control stand before starting repairs on engine.
23. Never open or close a valve on which a danger tag has been placed.
24. When bleeding main line from gate box blow off, have two men present and a fire extinguisher available.

From The Southern Natural Gas Co.
Birmingham, Ala.

The Market Beyond the Mains

— — and what it promises for the utility

By H. EMERSON THOMAS
H. Emerson Thomas and Associates
Westfield, N. J.

WHAT is our market for gas beyond the mains?

It includes every home where the income is sufficient to make possible some expenditures over and above the bare necessities of life and where there is a desire to have home conveniences. It is up to the gas industry to create a desire in these homes for use of the most modern and convenient cooking, water heating and refrigerating fuel—which is, of course, *gas*. In addition to the home use, we have the commercial users beyond the mains for their many important fuel needs. On the farm, outside the house, we have loads such as hot water or steam for sterilizing milk cans, tempering water for stock drinking, for debristling hogs, chicken brooding, killing by fire of germs and vermin in poultry houses, flame cultivating and many other varied uses.

Another market is in small industry uses, such as tool furnaces, furnace atmosphere control, various torch applications, singeing of cloth, laboratory use, cutting, and others.

There are now approximately 3.5 to 4 million users in the United States. They have been developed largely since 1928. The majority are purchasers of the so-called "bottled gas" type of service, which utilizes ICC cylinders, either with cylinder or tank truck delivery. There is a smaller number, primarily in the south, which uses bulk customer tanks and delivery by tank truck. The industry as a whole does not feel that there is much of a future in selling LP-Gas in the north for major house heating, because of the longer and more severe cold weather and because of competition.

It is estimated that east of the Hudson River there are approximately a quarter million bottled gas users. Surveys in the rural farm areas indicate that consumers using cruder types of fuels are distributed as follows:

Maine	41,893
New Hampshire	17,689
Vermont	27,043
Massachusetts	34,804
Rhode Island	4,309
Connecticut	32,088
	157,826

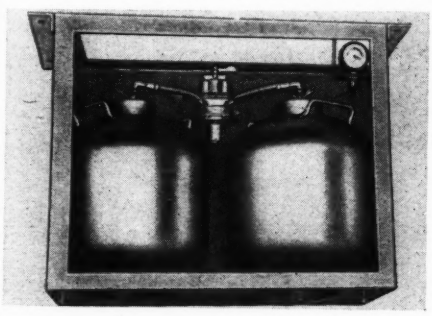
The majority of such farm homes, in addition to the small town and suburban homes, are prospects for LP-Gas. With the latter, the number of prospects should be increased several times.

Now, what should our purpose as gas utility operators be in having people beyond the mains become gas users? First and most important, I believe, is to sell the idea of gas universally. If we do not do this, we will, in effect, be putting a noose around our gas utility neck. Then, when we fail to sell those people beyond the mains on gas, no matter where they live, we are giving the jerk to the noose.

If the small town, rural or suburbanite housewife of the future is raised in a home using electricity for cooking, water heating and refrigeration, what chance have we to sell her the use of gas when, at a later date, she moves to a location where gas is available through mains? Also, if we have not helped to step up the rural, small town and suburbanite housewife from a cruder type fuel to gas, we have reduced our chances of having a ready-made gas customer when we expand.

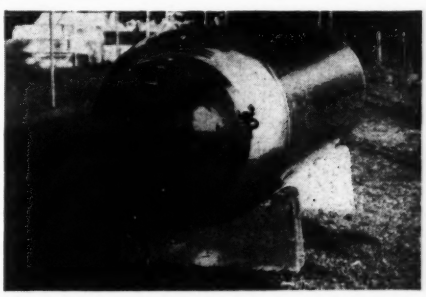
It would seem to me then that we, as utility operators (here I might emphasize that although I started primarily as an LP-Gas operator, I am now also operating nine utility companies) must make it a major purpose in our forward thinking to create a universal desire for gas service whether it be on or off the mains.

But how shall we do this? We can do it by going into the bottled gas business ourselves in our general areas; or we can accomplish the same objective by working in close harmony and



AT LEFT: Conventional two-cylinder system, with automatic changeover. One cylinder is in use, the other reserve.

AT RIGHT: Single cylinder system. The tank is replaceable, being substituted about every 30 to 60 days.



BELOW: A typical bulk plant. Various types of cylinders are shown at left.

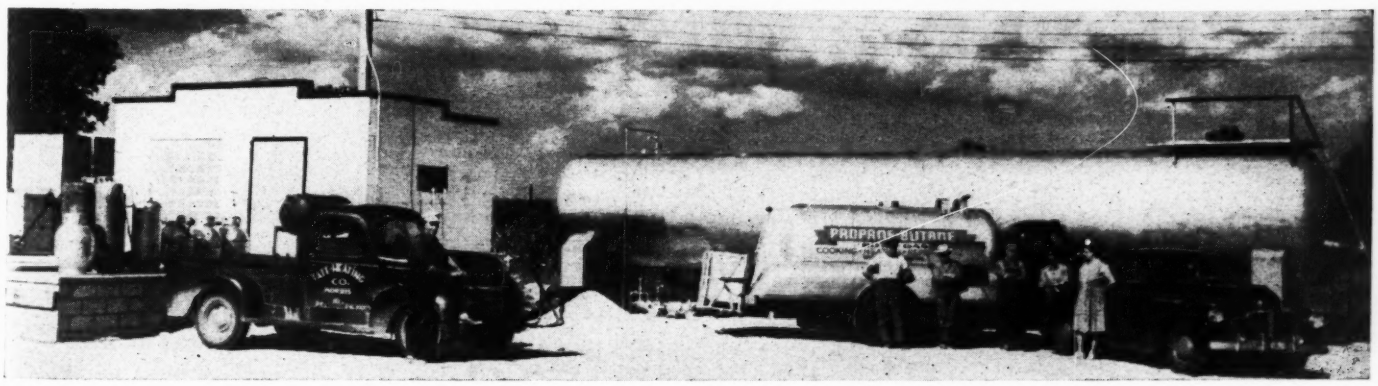


TABLE 1. COMPARATIVE ESTIMATED COSTS OF DIFFERENT TYPES AND SIZES OF LP-GAS CUSTOMER EQUIPMENT

Equipment	Automatic Two Cylinder	Manual Two Cyl.	Replaceable Cylinder	Cash and Carry Auto.	100-gal. bulk	250-gal. bulk	1000-gal. bulk
Containers	(1) $27.00	(1) $27.00	(2) $13.50	(1) $14.00	$100.00	$130.00	$375.00
Containers valves	3.60	3.60	1.80	3.20	.....	.....	.....
Regulator assembly	14.20	9.90	4.00	14.60	20.00	20.00	25.00
Hood and housing	3.75	3.75	2.50		7.50	10.00	15.00
Gauging device					2.50	2.50	4.50
Base or foundation	1.00	.60	.60		2.50	10.00	15.00
	49.55	44.85	22.40	31.80	132.50	172.50	434.50
Installation	10.00	10.00	9.00	9.00	25.00	30.00	45.00
Freight estimated	2.60	2.50	1.30	1.10	7.50	15.00	45.00
Piping	5.00	5.00	5.00	5.00	10.00	15.00	20.00
	67.15	62.35	37.70	46.90	175.00	232.50	544.50

Costs are based in general on 250 to 500 units per purchase.
Above figures are typical and may vary in different locations. Bulk units are based on aboveground tank; buried units would add to expense of installation.
(1) Two cylinders (2) One cylinder

cooperation with the bottled gas dealer or distributor or a number of them in such territory. Let's not make the error of assuming that all bottled gas operators are "small fry" who are unable to give proper service, just as some utility gas companies are. The LP-Gas industry couldn't be serving today the 3.5 to 4 million users if it was not built on some firm foundations.

Whether or not in your territory you actually distribute bottled gas or merely cooperate with the bottled gas man is immaterial so long as we sell gas as the *universal* fuel for cooking, water heating and refrigeration.

A word of caution, however, might be in order for those utilities contemplating their own operations beyond the mains.

Wider Area Needed

In the first place, I do not believe any operation should be carried on to those prospective customers "just beyond the mains." I believe a wider area has to be served to create the necessary number of customers to make a good operation and to do a good job of selling *gas*.

Secondly, you will have to change your normal concept of investment and operating cost. In a utility operation, investment is large per customer and is comparatively inflexible. The investment in bottled gas operations is considerably less, but more flexible. On the other hand, distribution costs of manufactured gas are extremely low compared to those on bottled gas, which are high per customer. With LP-Gas, distribution is the major operation, whereas with utility gas, production is the major operation.

In New England there are four systems which I believe should be studied. These are:

1. Conventional two cylinder system where one cylinder is in use and a second cylinder is in reserve. This system may be equipped with an automatic change-over device which allows flow from the reserve cylinder when the supply cylinder is empty. Without this device, the customer himself changes to the reserve cylinder. In either case, the customer then orders a replacement cylinder. If he should neglect to order a replacement, he will run out of gas, which may necessitate a special delivery by the operator.

2. A replaceable cylinder with monthly billing to the customer. In this system, one or more cylinders are installed, the number being determined by the load between regular deliveries. On a regular schedule, usually 30 to 60 days, the partially empty cylinder is removed and replaced by a full one. In any event, enough gas is left at the customer's location to assure him a supply, based on his known consumption record, plus a conservative surplus to take care of any unusual use. With smaller customers, deliveries are usually made each 60 days so as to keep delivery cost to a minimum. Most companies, however, give monthly billing on these 60-day delivery customers. It is, of course, an estimated bill. Consumption is determined either by weight or by meter, usually by weight.

3. A "cash and carry" system, sometimes called "self service." In this system, two cylinders are installed, one being kept in reserve. These can also be either automatically or manually changed over from supply to reserve cylinder. This system differs from the conventional two-cylinder system in that the cylinders have a capacity of 20 lb. each, compared to the 50-lb. to 100-lb. capacity of conventional cylinders. In this system, the customer must return the empty cylinder and exchange it for a full one. The installation is so designed that the cylinder can be readily connected and disconnected without using wrenches and yet retains a tight connection.

4. The last system is the bulk system using a cylinder or cylinders of 100-lb. to 420-lb. capacity or ASME Code tanks of from 150 to 1000 gal., with delivery by tank truck. With cylinder use, the consumption may be measured by weight, by meter or by liquid level gauge; with bulk tank systems, by meter or by liquid level gauge. Usually monthly billing is used.

Now, in regard to the cost of these systems from an investment standpoint: they will run approximately as shown in *Table 1*. Summarizing these costs, it will be noted that there is a wide variance in investment cost per customer equipment. The investment in the replaceable cylinder monthly billing system is the lowest, and in the bulk system, the highest.

The installation revenue to the operator is of two types. First and most widely used is an installation charge similar to the charge for installing a telephone. In such cases the equipment, including a limited amount of tubing to connect to appliances, is loaned to the customer for use with the operator's gas. This charge generally ranges from $19.75 to $54.75.

The second method is on an outright

TABLE 2. ADVANTAGES AND DISADVANTAGES OF SYSTEMS OF LP-GAS DISTRIBUTION

Type of System	Advantages	Disadvantages
Conventional Two-Cyl. Automatic or Manual	1. Medium size storage of gas is possible on customer's premises. 2. Operator usually sells for cash, thus does not tie up investment in inventory at customer location.	1. Customers must order replacement cylinder. 2. If customers fail to order replacement cylinder, they will be completely out of gas until operator can make delivery. 3. If customers run out of gas, operator must make special delivery. 4. Higher equipment investment is required than with replaceable cylinder monthly billing system. 5. System does not lend itself to a monthly billing type price schedule, making load building less attractive to consumer. 6. Customer usually pays for gas before using it and pays more per payment than on monthly billing basis. 7. Service truck has to deliver in same area several times each month.
Replaceable Cylinder—Monthly Billing	1. Customer has continuous non-interrupted service. 2. Customer pays for gas after using it. 3. Customer pays on a regular monthly basis. 4. Customer does not have to order any gas deliveries. 5. System entails lowest investment in customer equipment of all systems. 6. The monthly billing basis makes possible intensive promotion of load-building appliance sales. 7. System lends itself to establishing a regular route once a month or every 60 days to cover customer.	1. Operator must carry inventory of gas at customer's location. 2. If customer used unusual quantity of gas beyond regular use, plus surplus left on premises, he would run out.
"Cash and Carry"	1. Only a medium investment in equipment is needed. 2. No delivery organization has to be set up, as customer transports own cylinders. 3. This system fits into seasonal type business where frequent change of tenant of cabins is expected. 4. It makes gas service available to locations not conducive to regular year-round truck operation. 5. It makes possible lowest possible sale price for the cooking load only because of no delivery cost.	1. Average customer uses about 300 lb. per year, and therefore has to get replacement cylinder about every 24 days. 2. System does not lend itself to load-building because it is impractical to use sliding or step type of price schedule, and because large load would require too frequent changing of the 20-lb. cylinders. 3. Depots where cylinders are available must be in normal shopping area of customer.
Bulk Systems	1. Customer has continuous non-interrupted service. 2. Customer usually pays for gas after he uses it. 3. Customer pays on a regular monthly basis. 4. Customer does not have to order gas deliveries. 5. The monthly billing basis makes possible load building appliance sales. 6. System lends itself to regular deliveries on route once a month or less frequently, depending upon the amount of storage. 7. With proper size customer storage, the propane purchases can be made from the producer throughout the year on a fairly even basis, rather than in peaks and low points.	1. Much higher investment per customer than with other systems is required. 2. Operator must carry high inventory of gas at customer's location. 3. If customer uses unusual quantity of gas beyond anticipated use, plus surplus left on premises, he may run out.

sale basis. This is usually on the bulk type system and the sale prices range from $150 to $500. There is generally a merchandising profit to the operator, while with the lease basis the operator usually makes an investment in customer equipment. The lower customer charge on the lease basis makes it possible to reach a much larger segment of the potential market than is the case with higher outright sale.

In regard to the four types of systems set out above, I will set out some of the points for and against each. (See *Table 2.)*

In regard to the conventional two cylinder automatic and manual systems, they will be covered as one, as their values and disadvantages are similar, except that the automatic system does not require the customer to change from one cylinder to the other.

In regard to delivery costs, these vary not only by type of system, but also according to various other factors such as size of territory, concentration of customers, wage rates, size of customer loads, and size of total territory load. No one set of figures as to the various items entering into delivery costs would fit all cases. Such costs, however, range from less than 1 cent to over 4 cents per lb. These delivery costs are, of course, not all the costs involved in an operation. Billing, collecting, telephone, heat, rent, bookkeeping, traveling, supervising, insurance and many other items must be considered.

Reconditioning The PG&E Bay Line

By RALPH S. NABORS

Pacific Gas and Electric Co.
Hollister, Calif.

The war interrupted a reconditioning program begun in 1940 by Pacific Gas and Electric Co. on its line from Kettleman Hills, Calif., to the San Francisco Bay area. When in 1946 it was possible to resume the project, an additional two or three years of uninhibited corrosion had made necessary an intensive program of pipe removal.

A total of 70,000 ft. of line designated from locations where repair was most urgently needed was excavated, reconditioned, and replaced without removing the pipe from service for more than a few hours at a time. Sections removed were reconditioned in the yard, if still serviceable, and returned to the line; in this manner 55,000 ft. of pipe was saved.

Mr. Nabors, who superintended the job, is general foreman in the Department of Gas Supply and Transmission. A graduate in 1927 of Oklahoma Baptist University with a B.S. degree in chemistry, he studied civil engineering for two years at Healds Engineering College, San Francisco, and joined PG&E in 1929. Since then he has devoted full time to the problems of gas line construction and operation.

RECENTLY the Pacific Gas and Electric Co. completed the reconditioning of 70,000 ft. of 20-in. gas transmission line. This project is a portion of a long range program which has been carried on for several years.

This line was installed in 1929 to convey natural gas from the Kettleman Hills area to the San Francisco Bay area. This section of pipe line is approximately 150 miles long, beginning at the Kettleman Compressor Station and terminating at Milpitas Meter Station.

Protection

Locations on this line are designated by mile, numbered north from Kettleman. There are 40 miles of 22-in. pipe extending from Kettleman to Mile 40.0 and 110 miles of 20-in. pipe between Mile 40 and Milpitas terminal.

Portions of the pipe line are wrapped with a protective coating of primer paint, asphaltic tar, pipe covering and Kraft paper. The portions that are coated or bare are as follows: The section between Kettleman and Mile 97.7 is bare, but from Mile 97.7 to Milpitas the pipe is protected with a single wrapping with the exception of pipe line located in the vicinity of Miles 104 and 109, which is double wrapped.

Terrain

The terrain in which the gas line is located varies from desert land in the south to mountains in the area between Mile 47 and Mile 90 to cultivated orchard land in the north. The soil, extending from Kettleman to approximately Mile 47, is very dry and predominantly sand. As the pipe line goes north from Mile 47, it runs through rolling country and crosses numerous gullies which are traversed, in most cases, by exposed spans. This type of country continues to the vicinity of Mile 68. The soil in this area is predominantly dry and sandy and rainfall in the area would not exceed an annual average of 5 in.

From this point the pipe line rises to higher elevations rather rapidly and goes through rough, rugged mountainous country, traversed by numerous creeks and canyons, the canyons being spanned in many cases by open spans or aerial crossings.

Near Mile 90 the line leaves the mountains and drops down into the

Plan used in tying in reconditioned line to existing line. A trench was dug parallel to the line and in as close proximity as possible, 18 to 24 in. below the bottom of it. After new section was welded in, old pipe was lifted diagonally over it and removed for repairs.

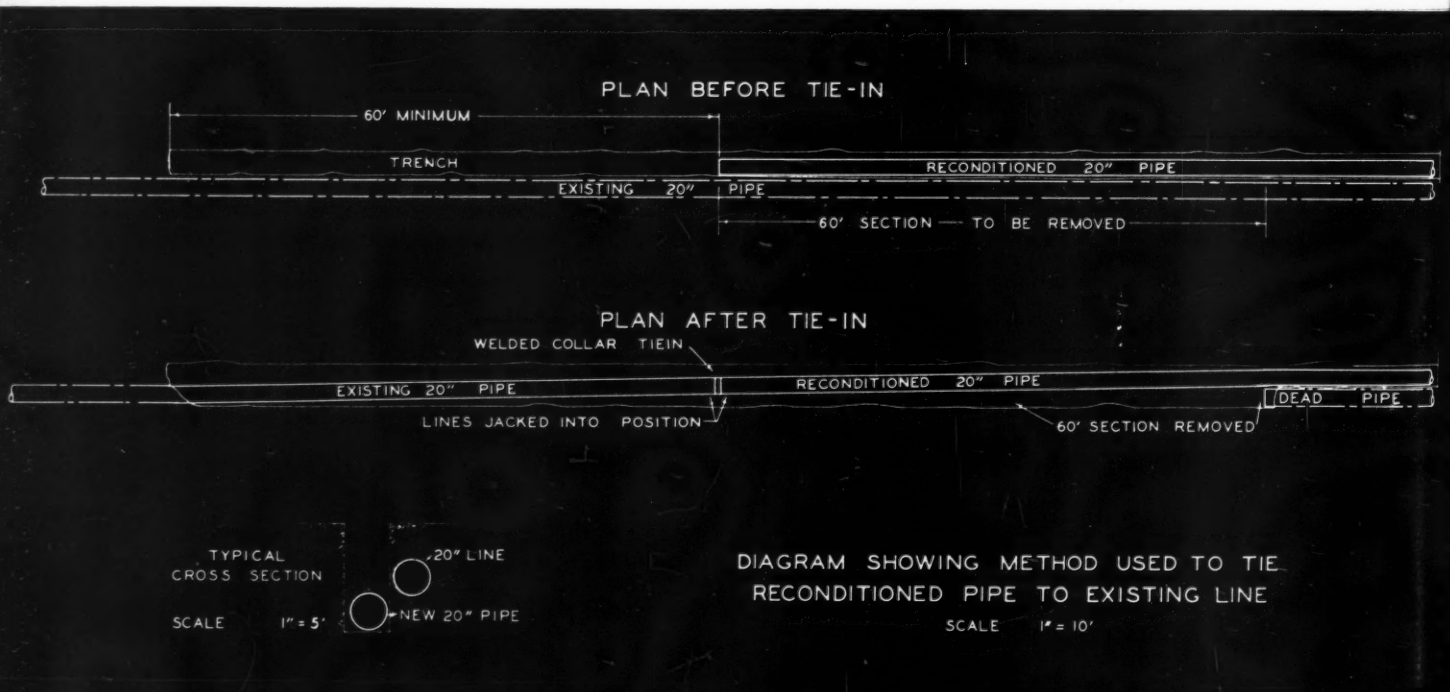


TABLE 1. EQUIPMENT USED

Trencher, wheel type	1
Trencher, ladder type	1
Tractor, 70 hp, with side boom	1
Tractor, 80 hp, with side boom	1
Crane, Truck, equipped with clam shell	1
Crane, tractor type	1
Tractor, 40 hp, with angle blade	1
Tractor, 60 hp, with dozer blade	1
Truck, semi low bed, interchangeable to pipe dolly	1
Truck, flat bed, 1½-ton	1
Pickup	2
Cleaning machine	1
Wrapping machine	1
Welding generator, truck-mounted	3
Welding generator, not mounted	1
Acetylene equipment	3
Scarfing rings	3
Sandblast equipment	1
Concrete mixer	1
Paint spray gun and equipment	1
Compressor	2
Tar pot	4

San Benito and Santa Clara Valleys, following through these valleys, skirting hills on the eastern side, to the Milpitas gas terminal. The soil in this area is heavy adobe, extensively cultivated.

Corrosion Survey

A corrosion survey was made over this entire line in 1942 and certain areas rechecked in the years following. These surveys, together with actual leak frequency data and visual inspection, were the basis for a long-term program of protection and reconditioning. This program, started in 1940 with the installation of a cathodic corrosion eliminator at Mile 107, was continued through 1943 but, due to war conditions and manpower shortage, was halted in 1944.

By 1946, when it was again possible to resume an orderly program of reconditioning, we were faced with the necessity of a sizeable project. We selected, as most urgently in need of reconditioning, 70,000 ft. of line located intermittently at four locations, between Mile 54 and 94.

Shut-Down Required

Load conditions prohibit the removal of this line from service for more than a few hours at a time, and then only when load requirements are at a minimum. Since some of the pipe in these areas had become so severely affected by electrolytic corrosion that repairs to leaks or corroded pipe could no longer be made without shutting down the line and because the extensiveness of the corrosion was so great, it was decided that the line could not be reconditioned while in service.

Faced with these conditions, we decided on a plan which was briefly this: installing a section of wrapped line adjacent the present line, shutting down for sufficient time to tie in the reconditioned section to the existing line, and removing and reconditioning the old section. This plan was followed throughout the project, the length of replacement sections being determined by the availability of pipe.

The physical work was performed by contractor under the supervision of our General Construction Department. The Pipe Line Operating Department arranged for and made all shut-downs necessary for the performance of the work.

Makeup of Crew

The contractor's crew consisted of an average of 40 men with the maximum being 49 and the minimum 6, these latter required at the end of the project for clean-up work. The crew, except for welders, machine operators and a few key men, was made up of comparatively inexperienced men hired at the job site. Labor turnover and transfer of men to and from the job, particularly in the case of welders, was tremendous.

All equipment used on the job was furnished fully operated by the contractor. The equipment listed in Table I was used during the course of the job.

All wrapping material was furnished by the company and delivered by truck to the warehouse near the job locations. From these storehouses material was hauled by the contractor, as needed, at his expense. (See *Table 2.*)

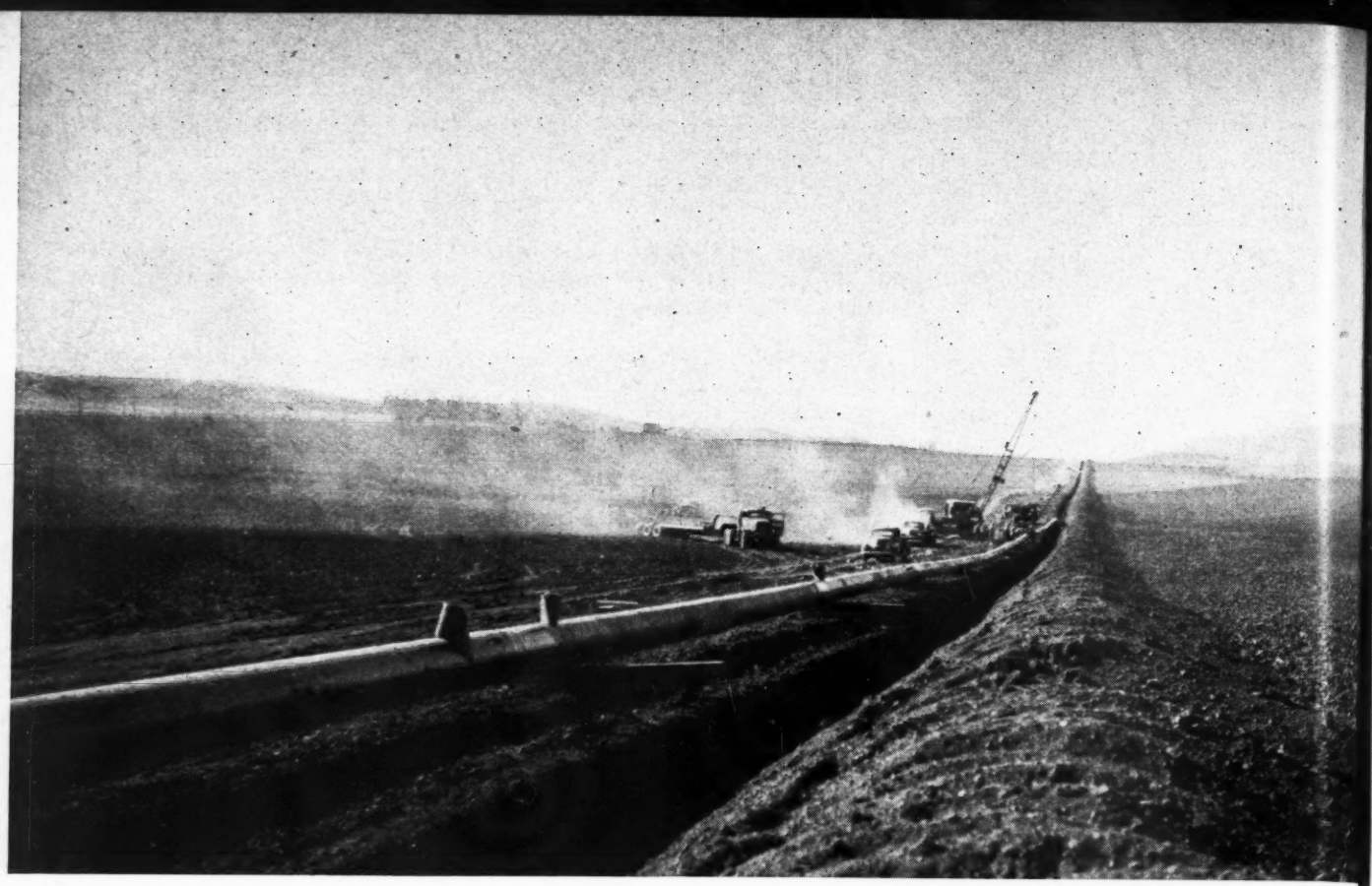
The percentage recovery of pipe on the reconditioning project was 90.97%. Of the 6348 ft. of pipe not reconditionable, approximately two-thirds was in such condition that it will be used for corrosion eliminator pilot installations.

First Step

The first step in the program was the excavation of a trench parallel to the existing main in as close proximity as possible, so that take-up would be facilitated, and 18-in. to 24-in. below the bottom of the old line. Pipe, available from either stock or reconditioned pipe, was primed and wrapped, strung and electric welded alongside the new trench. Air pressure at 90 to 100 lb. was used

TABLE 2. MATERIALS USED

Wrapping Material:	**Total**	**Amount per Lin. Ft. 20-in. pipe**
Asphaltic Tar	481,000 lb.	7.35 lb.
Covering, Felt	492,228 sq. ft.	7.52 sq. ft.
Gauze Sat. Strip	21,037 sq. ft.	.32 sq. ft.
Primer, Paint	1273 gal.	.019 gal.
Thinner	723 gal.	.011 gal.
Steel Box Strapping, ⅜x.015 in.	1902 lb.	.029 lb.
Miscellaneous Material:		
Rod, Welding, Electric	7150 lb.	.105 lb.
Sand—Sandblasting	57,500 lb.	24.8 lb.
Installation data on the job is as follows:		
Total pipe available from stock		12,179 ft.
Pipe installed—includes reconditioned and wrapped pipe on job and factory wrapped pipe		67,899 ft.
Pipe reconditioned in place—includes pipe adjacent to each valve and in one canyon. Excavated, sandblasted, reconditioned, primed and wrapped		1,675 ft.
Pipe taken up		67,899 ft.
Pipe machine cleaned—includes pipe taken up and pipe from stock		70,213 ft.
Pipe primed—includes all pipe wrapped on job and pipe stocked at substore for future use		70,165 ft.
Pipe wrapped—includes bare pipe taken from stock		63,735 ft.
Pipe sandblasted in yard		645 ft.
Pipe reconditioned and reinstalled		55,720 ft.
Pipe from stock		12,179 ft.
TOTAL		67,899 ft.
Pipe returned from the job totaled 12,179 ft., offsetting pipe charged to the installation. This pipe is classified as follows:		
Pipe reconditioned to full pressure rating		5831 ft.
Junk pipe, good for pilot pipe for corrosion eliminators		4263 ft.
Pipe sold to junk dealer; scarfing rings, short junk lengths		2085 ft.
TOTAL		12,179 ft.



Installing pipe parallel to the old line. In the distance can be seen the point of tie-in.

in testing welds. The field joints were then wrapped, approved methods and materials being used—including box strapping for securing the wraps—skid marks and other breaks in wrapping were patched, and the new section was lowered into the trench.

Preparations for shutdowns of the existing lines were made to coincide with completion of the new section to be tied in. Sixteen shutdowns were made. The average time for a shutdown was 3½ hours. Due to heavy load conditions two of the shutdowns were made at night and one on Sunday.

As soon as the line section was blown down cuts were made at the upstream end of the section to be tied in and a 60-ft. section of the existing line removed. The new section was then lined up with the existing line and purged. After purging, the open end of the new section was bagged to prevent entrance of air. Upon completion of the purge the sections were welded, with a "wedding ring" being used to facilitate the joining of the pipe ends. By the time welding had started the equipment had moved to the downstream end of the section, where cuts were made, another section of pipe lifted clear, and the lining up and welding process repeated. After the welding was completed the line was returned to normal service.

TABLE 3. COST OF RECONDITIONING LINE

Contract Cost			
Excavate and take up	67,899 ft. @ .32	$ 21,727.28	
Install Line	67,899 ft. @ 1.05	71,293.95	
Clean and prime	70,165 ft. @ .13	9,127.65	
Wrap	63,735 ft. @ .35	22,307.25	
Sandblast	645 ft. @ .37	238.65	
Recondition in place	1675 ft. @ 2.12	3,551.00	
Recondition pipe and misc. charges		5,300.00	
		133,545.78	$133,545.78
4164 ft. pipe, 20 in. SW @ 3.30		13,741.20	
8015 ft. pipe, 20 in. bare @ 2.82		22,602.30	
55,720 ft. pipe, 20 in. reconditioned @ 2.11		117,569.20	
Wrapping material and misc.		17,500.00	
		171,412.70	
Stores expense (10%)		17,141.27	
		$188,553.97	188,553.97
Gas blown on shutdowns			1,660.00
Freight on material			1,112.98
Inspection cost, general engineering, field accounting, etc.			19,986.15
			$344,858.88
General overhead (16%)			55,176.42
			$400,035.30
Salvage			
61,551 ft. 20-in. pipe, reused or returned to stock, @ 2.11			129,872.61
NET COST			$270,162.69
Cost per foot—$3.88			

Taking Up Line

The next step, which followed immediately after the tie-in was complete, was the taking up of the bypassed section of main. The old line was removed by lifting the pipe diagonally over the newly installed section. To perform this work effectively

two side-boom tractors were used. One was equipped with a sling looped around the pipe and tied off with a line to the frame of the tractor. The load line of the side boom was hooked into this rigging. The resultant lift and side pull raised the pipe as the tractor traveled along the trench. The second tractor lifted the pipe from over the trench and placed it on the earth adjacent as it was freed by the lead tractor. In favorable ground we were able to remove as much as 5000 ft. per hour in this manner. Excavation directly over the pipe to effect removal was necessary in only one section, for a distance of approximately 2000 feet.

The pipe, after its removal from the trench, was cut into 60-ft. lengths for ease of handling, and transported to a pipe cleaning and wrapping yard. Here all pipe that was not obviously worthless was put through a cleaning machine. This unit is a conventional gasoline-engine-powered cleaner with one rotating head equipped with spring-pressured, knife-like cutters followed by a rotating head equipped with steel wire brushes. Any pipe that did not react to this cleaning was sandblasted.

After the cleaning process the pipe was thoroughly inspected and the obviously worthless portions were discarded. The remaining cleaned pipe was then reconditioned to meet predetermined specifications.

Specifications

Since the pressure requirement of the line was to remain unchanged, the following specifications for reconditioned pipe were selected as standard:

Pipe reconditioned with essentially the same wall thickness of the original pipe and suitable for the same service pressure as new pipe of the same weight and class.

Pipe to be in good serviceable condition, straight, not over 1/16-in. out of round at ends; with surface either free from corrosion products or sandblasted; containing no unwelded pits of depth in excess of 25% of new wall thickness, nor greater in area than 15 sq. in., nor 6 in. in greatest diameter.

Pipe may have shallow pits (less than 25% of nominal wall thickness) if not concentrated. Pits deeper than 25% of wall thickness shall be electric welded to full pipe thickness, but no single welded area shall exceed 2 in. in diameter. No internal pitting will be permitted.

Bevel cuts shall be smooth and the interior of the beveled end free from scale and burrs.

Welded jointers of nominal 40-ft. lengths shall contain not over three girth welds per joint.

No pieces shorter than 5 ft. 6 in. shall be joined.

Wrapping

After the reclaimed pipe was reconditioned it was then primed and given a wrapper of asphaltic tar, felt paper, and an outer coating of asphaltic tar over the felt. Final visual inspection was made and repairs to any damaged wrapping performed prior to the time the new section was lowered into the trench.

Wrapping was accomplished by revolving the length of pipe on rollers powered by a small gasoline motor, while asphaltic tar, paper and swab coat were applied by hand. Excess tar was recovered in a trough beneath the pipe and returned to the heating pots.

Completing the Cycle

From this point the reconditioned pipe was trucked to installation site, lined and welded, and made ready for installation, thus starting the cycle over again.

It should be noted that some of the line was reconditioned in place. At each side of main line valves occurring in the reconditioned area and across one precipitous canyon, a total of 1675 ft. of pipe was sandblasted, primed, spot welded and wrapped in position.

Preliminary accounting would indicate the cost of the project to be as shown in *Table 3*.

The results of the project were highly satisfactory. The cost, although not completely available at this time, compares favorably with reconditioning performed on lines in place. The cost per foot will approximate $3.85. The section of reconditioned line is considered substantially the same as a new line which, with present costs of material and installation, would approximate $5.50 per ft.

Economic Considerations

It is economically sound to remove and recondition pipe only when the recovery exceeds a certain percentage. It is rather difficult to assume a definite figure since the density of loss in areas would be a deciding factor. Assuming that reconditioning charges would increase somewhat in proportion to the percentage of pipe loss, with take up, cleaning and priming costs remaining constant, it would appear that this type of reconditioning program could be economically performed on large diameter pipe lines where a usable pipe recovery of 65% or more can be effected.

Procedure used in taking up pipe. The lead tractor moves along the pipe, freeing it, and the second tractor lifts the pipe from over the trench and places it on the earth beside the trench. Up to 5000 ft. an hour was removed by this method.

Presented at Transmission and Measurement Conference, sponsored by the Technical Section, Pacific Coast Gas Association, Fresno, Calif., May 14.

IMPROVED VACUUM METHOD

For Cleaning Gas Services

By W. C. PETERS

Assistant Gas Distribution Engineer
Northern States Power Co.,
St. Paul, Minn.

DEPOSITS in gas services have long been one of the problems of the gas industry, and as gas distribution systems are getting no younger, the means for quick, inexpensive methods of dealing with such deposits are receiving considerable attention in the gas utilization business.

Deposits of rust, frost and other foreign matter not only cause poor pressure conditions but also may be the major offender in producing pilot and control troubles. By themselves, the fine particles of matter carry along in the gas stream to stop off control ports and valves, and together with oil or water vapors make an excellent binder to cause grief.

All of us have used the pressure pumps and tanks whereby the deposits are blown back into the main to give one customer temporary relief, only to return and cause trouble at some future date. A progressive step from that practice was the introduction of air compressors as vacuum pumps to remove the stoppages from the system. Portable hand-operated vacuum pumps have also been used with a certain amount of success.

About seven or eight years ago we heard about a combination vacuum and rodding method used by Peoples Gas in Chicago. We experimented with the idea and made up several cleaning units utilizing domestic vacuum cleaner mechanisms. There were some operating defects which I will not elaborate on, but the units did clean the services. Various improvements were made from time to time; I will describe the equipment and methods we now use.

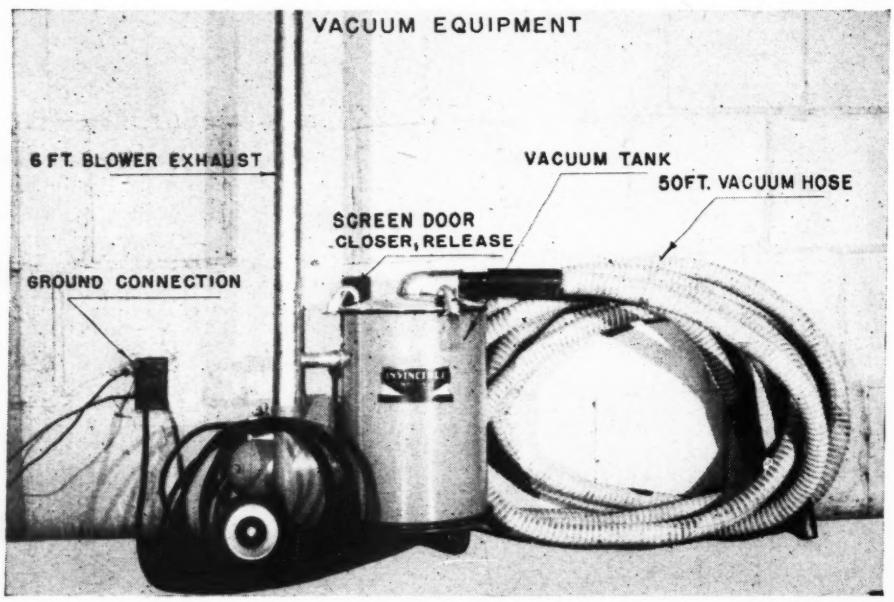
The vacuum unit is a self-contained blower and tank mounted on wheels, which during operation is placed outside the building on the down wind side. A vacuum hose from this, together with an extension cord for operating the unit, are led through a window to the service. The cord should have a grounding connection, the exhaust from the blower should have a 6-ft. vertical section, and the cover on the vacuum tank should have a self-releasing type fastener.

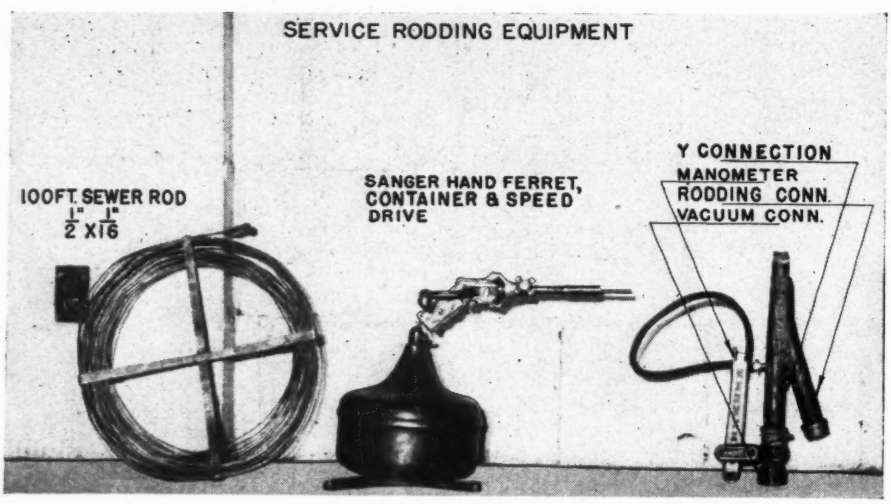
A 1¼-in. "Y" pipe connection is so fitted that the single leg of the Y attaches to the house tee. One of the double legs of the Y has a removable cap through which the tape or ferret is fed, and the other leg has a stopcock to which the vacuum hose attaches. There is also a manometer connection on the Y fitting so that the service pressure can be taken. This Y fitting is 18 in. long.

The rodding tape can be either a plumber's steel tape or a coil spring ferret, such as is used in the Roto-Rooter. We carry both types for reasons which I will later explain.

The clearing operation is quite simple. We use a two or three-man crew, but when a two-man crew is used, there are times when without an attendant the vacuum unit is discharging a mixture of gas and air, which may be explosive or combustible.

Before the service is opened, usual safety precautions are taken in regard to ventilation and lighting, and the customer is advised of the service interruption. The house service cap or plug is removed and the "Y" fitting is attached. A pressure reading may be taken under load to determine the





Vacuum and service rodding equipment used in the improved vacuum method.

degree of stoppage. Then the meters are turned off and removed. The motor unit is started and vacuum is applied to the service. By opening the meter cocks and tapping the riser and lines, these are first cleared.

Application of the vacuum to the service quickly discloses whether the stoppage is being removed. The velocity of the particles of deposit make an audible sound as they strike against the vacuum hose surfaces on their way out. If the vacuum alone does not clear the stoppage, a steel tape or coil spring ferret is fed into the Y connection while the vacuum is continued. The vacuum is sufficient so that a negative pressure is maintained at the opening where the tape is inserted, and therefore no gas escapes in the building. The coil spring tape must be used on side services or where bends occur in the service pipe. This type is also more effective in drilling through ice or hard deposits. A bevel gear driven crank expedites the feeding of the ferret under difficult conditions. Where solid ice prevents complete clearing of a service, it is at times necessary to withdraw the tape, remove the Y and apply alcohol as a thawing agent.

A point of operation to which attention should be given is that, after the tape has been worked through the obstruction or up to the main and then withdrawn, the tape connection on the Y should be capped and the vacuum continued until deposit stops coming through. At such time the equipment is removed, the service closed, the meters reconnected, and appliances relighted and adjusted where necessary.

One may question whether the vacuum might lower the pressure in the main or adjacent services to an unsatisfactory point. Our experience has been that the main pressures hold up where no main stoppage exists and where the main is of 4 in. or larger size. We do check the adjacent services and any service directly across the street before leaving, to assure that no pilots have been extinguished. In the event of a pilot outage, the next address would also be checked.

In summer time we have found that practically all services through which a tape can be run can be cleared effectively. In winter, about 90% of such services yield to vacuum treatment. The amount of deposit per service we are removing averages between 2 and 3 qts. The most that we have taken out of one service was 3 gals. It would take 28 ft. of 1½-in. pipe to hold that volume and so it was evident that the service was pretty well filled or deposit from the main was also withdrawn. The deposit we remove weighs about 18 lb. per gallon dry.

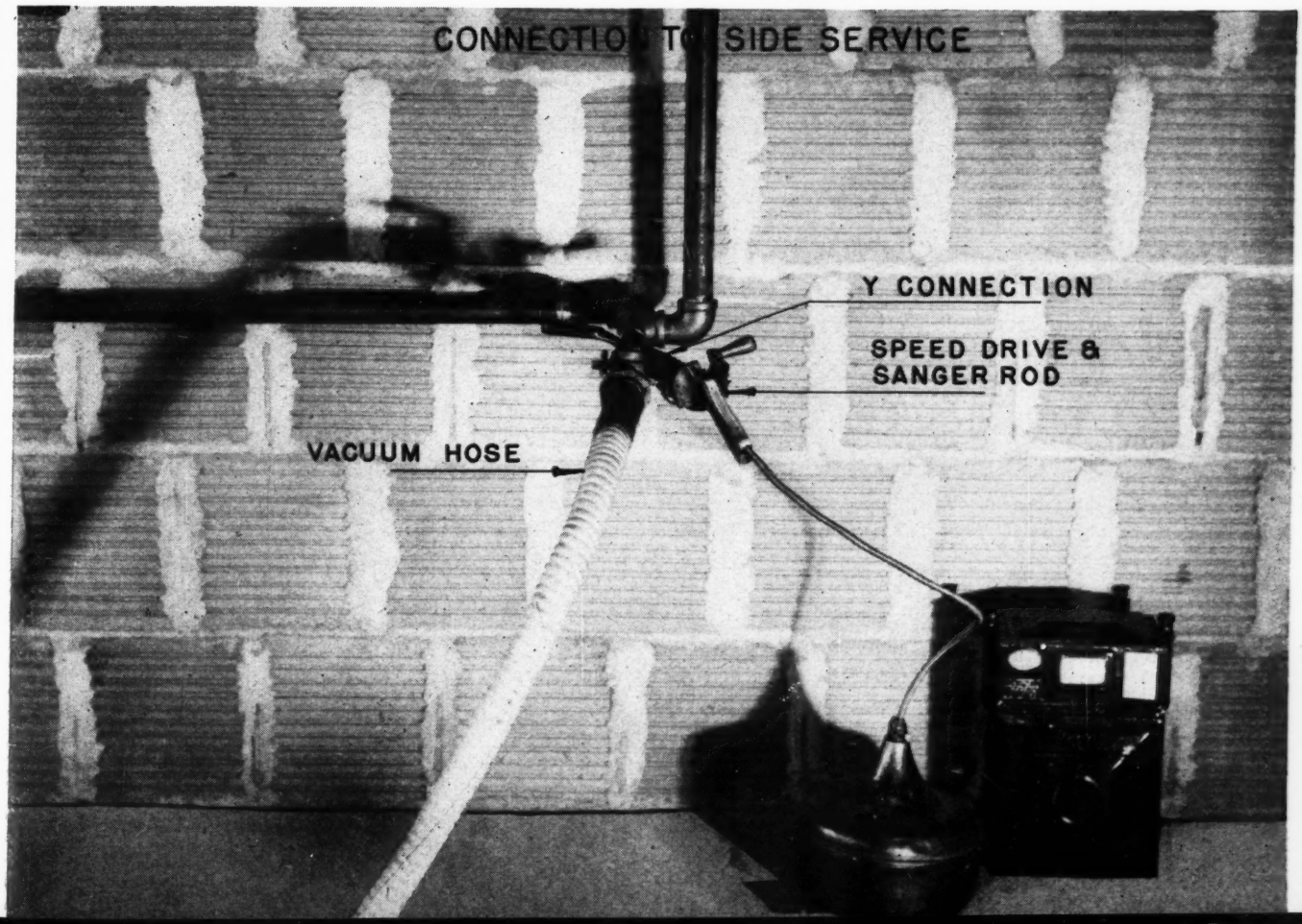
A few miscellaneous points that might be mentioned are that the maximum vacuum secured at the house tee is 3 in. of mercury, which falls to 2 in. while the service is being rodded. Actual time of cleaning a service is about an hour, but some services may require several hours. In addition to clearing services, risers and meter connections, the vacuum process is also good on house-piping.

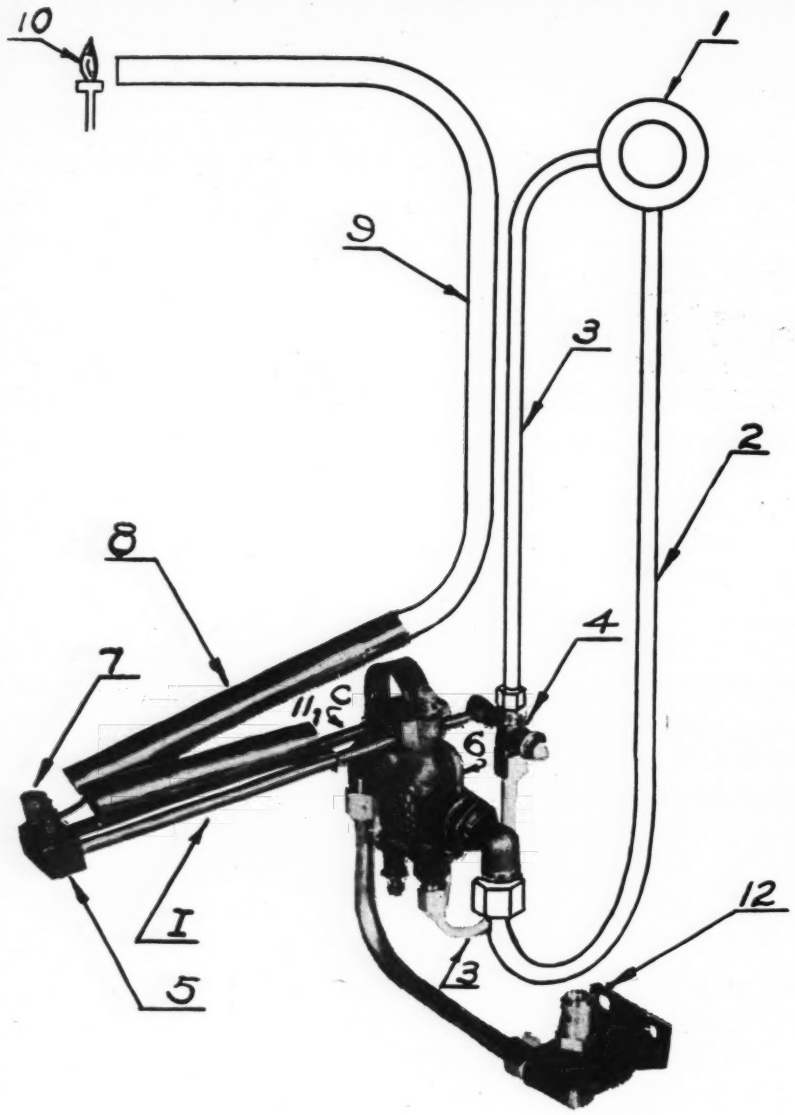
W. C. Peters, who explains how the system operates, has spent 20 years with the company, joining it in 1922 when the properties belonged to the old St. Paul Gas Light Co, and taking a 5½-year leave during the war to serve in the army. Most of the time since 1926 he has served in the Gas Distribution Department.

He was graduated from the University of Minnesota with a degree in mechanical engineering. His war service included barrage balloon and anti-aircraft intelligence work both in the South Pacific and in the Inspector General's Department, Washington, D.C.

Presented at Mid-West Gas Association Annual Meeting and Convention, Omaha, Nebr., April 7-9.

Typical connection of vacuum and rodding equipment to service for cleaning operation.





EXPLANATION OF SYMBOLS

1. Oven valve
2. Oven burner gas supply tube
3. Pilot gas supply tube
4. Ignition pilot control valve
5. Oven burner ignition pilot
6. Automatic pilot control
7. Flash pilot
8. Flash tube
9. Flash tube
10. Top burner pilot
11. Auxiliary flash tube
12. Oven burner orifice

C. Flash pilot gas supply tube

I. Ignition pilot gas supply tube

By GUY CORFIELD
Research Engineer
Southern California Gas Co.,
Los Angeles

Single Point Ignition

It is finding acceptance in manufactured gas areas but is not as yet adaptable to the more critical adjustment required with natural and mixed gas.

BY "Single Point Ignition" is meant automatic ignition, by gas, of all burners of a gas range from a single point or single constant burning pilot light, by means of flash tubes. Inasmuch as the oven and broiler burners are considerably below the top burners, interconnecting flash tubes must have vertical or at least sloping sections. There is not enough energy in the raw gas stream from a burner ignition port to enable the gas to travel any appreciable distance downward. Therefore the only practical expedient is to locate the constant burning pilot on a level with the top burners, as is normally done in top burner ignition, and ignite the oven and broiler burners by "vertical flash tube ignition" — upward propagation of gas-air mixture and downward flash of flame.

Presented before Utilization Conference, Pacific Coast Gas Association, Los Angeles, Calif., Feb. 26.

Advantages

Among the several advantages advanced for single point ignition are the following:

1. Only one constant burning pilot light on the gas range, and therefore:
   (a) Economy in areas where pilot light load is a significant expense because of high priced gas.
   (b) Minimum service requirements with only one pilot light to maintain.
2. Independent of other utility services (supplants electric ignition).

3. Oven stays cool when not in operation (constant burning pilot in or near oven causes temperature rise).

Literature

The American Gas Association Testing Laboratories have issued two research bulletins on this subject. Research Bulletin No. 17, "Automatic Flash Tube and Pilot Ignition of Oven and Broiler Burners on Manufactured Gas," was issued in August, 1943. Research Bulletin No. 21, "Single Point Flash Tube Ignition of Oven and Broiler Burners," appeared in March 1944. This latter bulletin has extended scope and "presents fundamental principles underlying the design and application of flash tubes for single point ignition on natural, mixed and manufactured gases."

An interesting paper was also presented by John G. Bennett of the Caloric Gas Stove Works of Philadelphia, under the title of "Single-Point Ignition of Broiler and Bake Ovens" before the 1946 annual meeting of the Pennsylvania Gas Association.

A section to cover single point ignition assemblies has been written for inclusion in AGA Approval Requirements for Domestic Gas Ranges, and is now being prepared for adoption.

Present Status

Considerable interest and progress in single point ignition have developed in the Eastern manufactured gas areas. This is in part probably due to the incentive to keep pilot light volume, and therefore cost, at reasonable figures. Also, the combustion characteristics of manufactured gas are favorable to flash tube ignition because of the rapid rate of flame propagation and the wide range of combustibility of gas-air mixtures. Several control manufacturers have designed ignition assemblies for manufactured gas, and some gas range manufacturers have equipped ranges with these assemblies and also, in a few instances, developed their own designs. Some utilities appear to be receptive to volume sales and customer usage of ranges equipped with single point ignition. Others seem to feel that more development and experience is desirable, and simpler and less expensive mechanisms may be necessary, before single point ignition can be given general acceptance.

No manufacturer, to the writer's knowledge, has equipped gas ranges with single point ignition assemblies for natural or mixed gas service, except on an experimental basis. One experimental model recently tested, operating on natural gas, performed with a high degree of acceptability when igniting the oven from a cold start, but ignition was quite uncertain from a warm or hot start. This appeared to verify the expectation that natural gas, with its relatively slow flame speed and narrow gas-air ratio limits of combustibility, requires a critical adjustment of flash tube mixture and is susceptible to upsetting factors.

Conclusion

Single point ignition for gas ranges appears to have desirable features and basic advantages, if it can be accomplished in a relatively simple manner without resort to complicated mechanisms which will be both expensive and conducive to service difficulties.

At the present time it is approaching generally acceptable practical use on manufactured gas, but requires more development for natural and mixed gas usage.

It has perhaps not yet had a fair opportunity for evolution, having been fostered during the war and immediate postwar years that have permitted little attention to such developments.

Details of Operation

Fig. 1 is a semi-schematic illustration of a type of oven burner ignition system using a bi-metal automatic pilot element. The steps in the ignition operation are as follows: Turning the oven valve (1) to the "on" position permits gas to flow through the oven burner gas supply tube (2) and the pilot gas supply tube (3). Part of the pilot gas flows through the ignition pilot control valve (4) and through the ignition pilot gas supply tube (I) to the oven burner ignition pilot (5). The remainder of the pilot gas flows to the automatic pilot control (6); part of it continues through ignition pilot gas supply tube (c) to the flash pilot (7) which ignites from the top burner pilot (10) through the flash tubes (8 and 9) and in turn ignites the oven burner ignition pilot (5); another portion of the pilot gas flows from an orifice in the automatic pilot control (6) into the auxiliary flash tube (11), is ignited by the oven burner ignition pilot (5) and, flashing back, ignites heater ports under the bimetal element of the automatic pilot control (6). Under the influence of this heat the bimetal element opens the main gas passage to the oven burner orifice (12); and also throttles the gas supply to the flash pilot (7), and to the auxiliary flash tube (11) and the bimetal heater ports.

As mentioned in the preceding section it is sometimes desirable, because of considerable vertical or overall distance, to promote the flash tube ignition in two steps. Thus (referring again to *Fig. 1*) it might be desirable to break the continuity of the flash tubes (8 and 9) by a separation at the bottom of the vertical portion of (9), and place a second flash pilot at this point. The flame would then travel from the top burner pilot (10) down to the bottom of flash tube (9) and ignite this second flash pilot; and the gas in flash tube (8) would be ignited by this second flash pilot and the flame then travel back to flash pilot (7).

Problems Introduced

Several physical and mechanical problems are presented to the designer of a flash tube oven ignition system, among which are:

1. The long flash tube, with horizontal, curved and vertical portions, entails lengthy and downward travel of the flame front, against the upward movement of the gas-air mixture and in and through its combustion products. It has therefore been found necessary to:
   (a) Adjust the flash pilot gas-air to a relatively rich mixture which is quite critical (particularly on natural gas) and which tends to produce odors when the flash pilot is ignited and burning into the bottom end of the flash tube.
   (b) Provide the flash tube with slots, baffles, constrictions, etc. to assist its performance, and under some conditions to promote the flash in two steps (See *Details of Operation*).
   (c) Provide mechanism to cut down or extinguish the flash pilot, after the oven burner ignition has been accomplished, to avoid the odors mentioned above.
2. The assembly includes an automatic pilot to provide the conventional safety features.
3. It is necessary for the various steps in ignition to take place rapidly enough to meet conventional requirements in ignition speed; and it is also necessary for the automatic pilot to shut off quickly, and the assembly to ready itself rapidly for recycling so that, if the housewife turns off the oven and then turns it on again, there will not be unreasonable delay in re-ignition of the oven burner.
4. The several mechanical functions required of the assembly tend to make it relatively complicated and expensive.

ASSOCIATIONS

Reed Nominated

Philadelphia Gas Works president heads slate for 1947-48

SUBJECT to approval at the 29th annual convention, Hudson W. Reed, president, The Philadelphia Gas Works Co., and incumbent first vice president of the association, will move into the president's chair of the American Gas Association for the 1947-48 term of office.

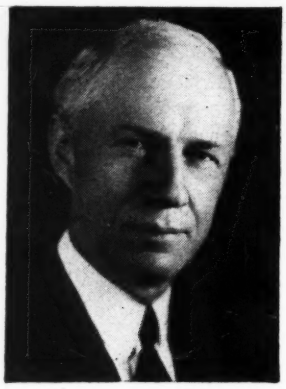
Robert W. Hendee, president, Colorado Interstate Gas Co., is slated for the first vice presidency, and Hugh H. Cuthrell, vice president, The Brooklyn Union Gas Co., has been nominated for the second vice presidency. E. F. Barrett, president, Long Island Lighting Co., is due to succeed himself as treasurer.

These nominations topped the list of recommendations submitted by general and sectional nominating committees last month. In addition, 15 new directors and 11 sectional heads were named.

The panel of directors includes:

Walter C. Beckjord, Cincinnati; Edward G. Boyer, Philadelphia; Henry R. Cook, Baltimore; Earl H. Eacker, Boston; Joseph N. Greene, Birmingham; D. A. Hulcy, Dallas; F. A. Lydecker, Newark; James S. Moulton, San Francisco; Edward P. Noppel, New York; John A. Robertshaw, Youngwood, Pa.; W. H. Rudolph, Newark; Louis B. Schiesz, Indianapolis; Edward J. Tucker, Toronto; Harry K. Wrench, Minneapolis; and C. H. Zachry, Dallas.

PRESIDENTIAL NOMINEE



Hudson W. Reed

Section and committee nominations are as follows:

Laboratories' Managing Committee—A. F. Bridge, Los Angeles, chairman; C. E. Bennett, Pittsburgh, vice chairman.

Accounting Section—John A. Williams, Syracuse, chairman; L. E. Reynolds, Hartford, vice chairman.

Industrial and Commercial Gas Section—Leon Ourusoff, Washington, chairman; Bernard T. Franck, Milwaukee, vice chairman.

Manufacturers' Section—D. B. Stokes, Burlington, chairman.

Publicity and Advertising Committee—R. G. Barnett, Portland, chairman.

Residential Gas Section—C. S. Stackpole, Baltimore, chairman; W. M. Jacobs, Los Angeles, vice chairman.

Technical Section—A. C. Cherry, Cincinnati, chairman; S. J. Modzikowski, Chicago, vice chairman.

Load Builders

Kitchen, laundry hold attention at conference

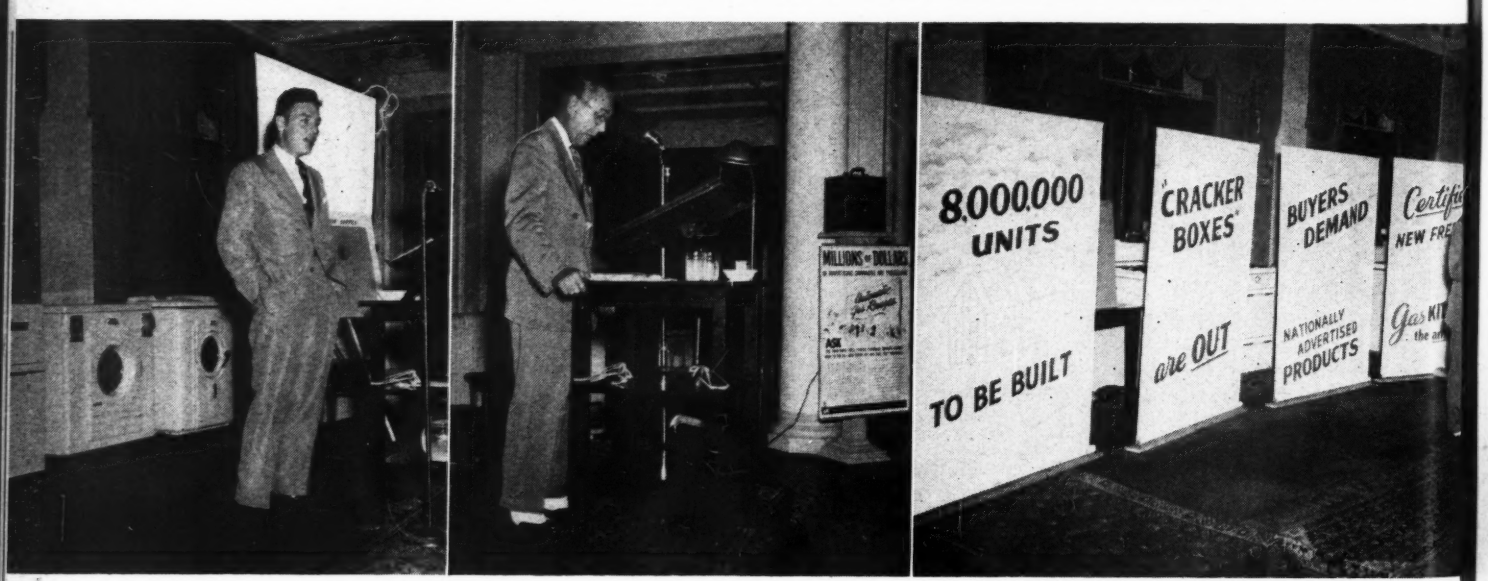
NATIONAL kitchen and laundry gas load-building possibilities received top billing on the agenda of the New York-New Jersey Regional Gas Sales Conference, June 23-24 at the Essex-Sussex hotel, Spring Lake, N.J. The AGA-sponsored meeting attracted 200 eastern sales and advertising executives.

Following the opening remarks by AGA Managing Director H. Carl Wolf, Walter G. McKie, RG&E, described the Rochester Kitchen Center, through which more than 50,000 visitors had passed during the 14 months ending June 1, as the first of four addresses in a New Freedom Gas Kitchen symposium. Martin Gibbons, Brooklyn Union Gas Co., explained how his company has sold 175 complete gas kitchens and $180,000 worth of equipment solely through a cooperative dealer plan. The value of home service in a kitchen promotional program was discussed by Evelyn Kirkpatrick, Boston. Winding up the symposium, H. Vinton Potter, director, AGA-GAMA New Freedom Gas Kitchen Bureau, announced a new tool for the selling phase of the program—a Certification Plan for new construction as well as for home remodeling. Kitchens which contain the following four requisites will receive from the bureau a certificate which will serve as a consumer buying guide, as well as an endorsement of the builder's judgment in selecting a unified kitchen: (1) Step-saving, time-saving, work-saving convenience. (2) Automatic gas range built to "CP" standards. (3) Gas refrigerator. (4) Automatic quick-recovery gas water heater.

Means of adjusting the pattern of salesmanship to the present era were outlined by R. J. Canniff, Servel. He expressed concern that utilities sales departments are still only 30% manned.

A three-way merchandising analysis

Three headline speakers at sales conference. At left, W. B. Hewson, chairman-elect, gives lowdown on "Gas Has Got It!" campaign; R. J. Canniff tells why sales forces must be expanded now; Vinton Potter explains new Certification Plan for kitchens.



of the home laundry business and its potential effect on gas load occupied most of the second day of the conference. M. R. Rodger, Bendix Home Appliances, Inc., Morgan L. Busch, Hamilton Manufacturing Co., and Frank McFerran, The Ruud Manufacturing Co., stated the case for home laundry promotion.

W. B. Hewson, member of the AGA National Advertising Domestic Copy Committee, who was elected conference chairman for 1948, previewed plans for the fall industry-wide advertising campaign, to be built around the slogan "Gas Has Got It!" The final address was a discussion on salesmanship by A. C. Fox, Fuller Brush Co.

Conference Chairman James P. Hanlan, gas sales manager, Public Service Electric and Gas Co., Newark, who retired July 1, was honored with numerous tributes to his many years of industry leadership. Walter G. McKie was named 1948 vice chairman, while James A. Sackett, Kings County Lighting Co., and Robert B. Denhardt, Central Hudson Gas and Electric Corp., were selected for the executive committee.

Convention Plans

With little more than three months to plan the annual convention, to be held in Cleveland Oct. 6-8, the committee in charge of general arrangements and programs for general sessions met at AGA headquarters July 2 to set in motion machinery for making the meeting the convention of the year.

The committee, headed by J. French Robinson, president, The East Ohio Gas Co., includes:

R. J. Canniff, advertising and sales promotion manager, Servel, Inc.; O. R. Doerr, general sales manager, Pacific Gas & Electric Co.; B. T. Franck, vice president, Milwaukee Gas Light Co.; L. C. Harvey, president, The Bryant Heater Co.; W. H. Ligon, president, Nashville Gas & Heating Co.; D. E. Maloney, agent, The East Ohio Gas Co.; Irving K. Peck, vice president, Manufacturers Light & Heat Co.; J. J. Quinn, vice president, Boston Consolidated Gas Co.; E. F. Schmidt, vice president, Lone Star Gas Co.; A. H. Stack, president, The Tampa Gas Co.; and Kurwin R. Boyes, AGA secretary.

AGA Notes

Approval Requirements. Modification and simplification of a number of approval requirements for gas equipment were reviewed during June by subcommittees of the Approval Requirements Committee. The incinerator group adopted changes covering new designs now appearing on the market. The appliance pressure regulator group concentrated on expansion of present test procedure indicated by past experience. The range committee adopted a number of proposals to simplify present requirements and to reduce the number of tests necessary for approval. Industry comments on proposed standards for dual oven combination ranges were considered. Also initiated during the month were proposed revisions to installation requirements for conversion burners.

Gas at Fall Shows. Combined gas exhibits will again be sponsored by the AGA at two national expositions scheduled for the coming autumn. Industrial gas equipment will be exhibited at the National Metal Congress and Exposition at the National Amphitheater, Chicago, Oct. 18-24, while commercial gas will be shown off Nov. 10-14 at the National Hotel Exposition, Grand Central Palace, New York.

At both shows gas will occupy a prominent place. It will comprise the largest single exhibit and will be arranged along the main aisle near the entrance.

Purging Procedure. Two AGA pamphlets giving recommended procedures for removing and putting into service gas holders and other works apparatus, and gas mains, are being rewritten by the Purging Committee under the chairmanship of A. D. Harrison, The Brooklyn Union Gas Co. They will be combined in one publication, and new material will include a section on LP-Gas. At a meeting of the committee in New York on June 5 proposed chapters relating to inert gases, testing and instruments, purging apparatus, piping, holders and mains, and the purging of LP-Gas equipment were reviewed and discussed.

Lab Vets Return. Three former employees of the AGA Testing Laboratories in Cleveland have returned to the staff. Paul D. Lawrence, who left the Lab. to join Richmond Radiator Co. and later the Glenn L. Martin Co. before entering the army, has returned to the Laboratories. William B. Pizzini was formerly associated with the W. J. Schoenberger Co. of Cleveland and served in the navy. Both men originally joined the Laboratories in 1937. Leon J. Buividas, who left for the navy in 1944, is again a member of the AGA testing staff in the central heating section.

Industrial Gas Breakfast. During the National Metal Congress and Exposition in Chicago, Oct. 18-24, the Industrial and Commercial Gas Section will hold its traditional Industrial Gas Breakfast. This informal get-together with the editors of the metals trade magazines will be held on the morning of Wednesday, Oct. 22, at the Hotel Stevens, Chicago.

Conference Dates Announced. The 1948 Distribution and Motor Vehicle Conference will be held April 19-21 at the William Penn Hotel, Pittsburgh, Pa., and the Joint Production and Chemical Conference will take place May 24-26 at the Berkeley-Carteret Hotel, Asbury Park, N. J., C. S. Goldsmith, chairman of the Technical Section, has announced.

CALENDAR

August

Appalachian Gas Measurement Short Course—West Virginia University, Morgantown, Aug. 25-27.

September

American Society of Mechanical Engineers, Fall Meeting—Salt Lake City, Utah, Sept. 1-4.

Mid-West Gas Association Annual Gas School and Conference—Ames, Iowa, Sept. 8-10.

Gas Division, Oklahoma Utilities Association—Biltmore Hotel, Oklahoma City, Okla., Sept. 19.

New Jersey Gas Association — Stacy-Trent Hotel, Trenton, N. J., Sept. 23.

Pacific Coast Gas Association 1947 Convention—Coronado, Calif., Sept. 23-25.

October

American Gas Association Annual Convention—Cleveland, Ohio, Oct. 6-8.

National Safety Congress and Exposition—Chicago, Oct. 6-10.

Texas Mid-Continent Oil and Gas Association—Gunter Hotel, San Antonio, Oct. 16-17.

National Metal Congress and Exposition—Amphitheater, Chicago, Oct. 20-24.

November

National Hotel Exposition — Grand Central Palace, New York, N. Y., Nov. 10-14.

December

American Society of Mechanical Engineers Annual Meeting — Dec. 1-5.

February, 1948

8th International Heating & Venting Exposition—Grand Central Palace, New York, N. Y., Feb. 2-6.

March

New England Gas Association—March 18-19.

Southern Gas Association—March 24-25.

Mid-West Regional Gas Sales Conference—Edgewater Beach Hotel, Chicago, March 29-31.

Movies

Biggest Inch and AGA films on convention program next month

LAST month a reconverted army plane carrying a camera moved along the western portions of the Texas-to-California line, photographing views of construction work on the nearly-completed section of the "Biggest Inch."

PCGA

Next month those views, properly cut and edited, will be flashed on the screen as one of the high points of the 54th convention of the Pacific Coast Gas Association, meeting in Coronado, Calif., Sept. 23-25.

Another movie has been accorded a spot on the streamlined program, as tentatively planned by President Leroy M. Edwards and his program committee. That will be the AGA's new laboratories documentary, "Winning Seals of Approval."

Carrying out the theme of the "Biggest Inch," which has been adopted for the convention, will be talks by Paul Kayser, president of El Paso (Texas) Natural Gas Co., on his company's part in bringing Texas gas to California, and Alden Roach, head of Consolidated Steel Corp., on "Steel Pipe for the Biggest Inch—A Western Achievement."

Other notables who will speak in general sessions include:

H. Carl Wolf, AGA Managing Director, "The AGA Program and How the PCGA Can Help Put It Over."

Capt. E. S. Pettyjohn, director, Institute of Gas Technology, "Gas Industry Research."

F. H. Lerch, president, Consolidated Natural Gas Co., "Institute of Gas Technology."

D. A. Hulcy, president, Lone Star Gas Co., "Gas Industry Promotion."

Dr. Lee A. DuBridge, president, California Institute of Technology, "The Future of Atomic Energy."

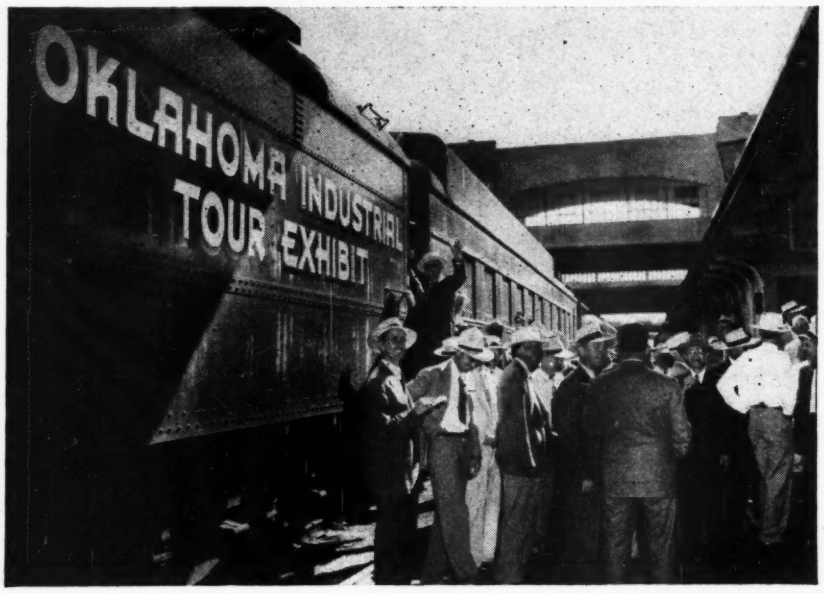
Elizabeth Sweeney, McCalls, "Equipment Research in Action."

H. P. Huls, president, Public Utilities Commission, "The Gas Industry in California and Its Future."

G. W. Wadsworth, Jr., vice president, Southern California Gas Co., "Industrial Relations Problems of Utility Companies."

R. H. Hargrove, president, AGA, "The Gas Industry Nationally."

C. A. Renz, manager of customer's service, So. Cal., "The Use of Technology in the Administration of Service to the Customer."



This special train shown just before it left Tulsa, Okla., June 25 for a tour of 11 northern and eastern cities, carried four baggage cars loaded to the doors with special exhibits showing Oklahoma resources. Principal object: to attract new industries to Oklahoma.

Given a prominent place in the exhibits were maps, charts, pictures and booklets listing the natural gas resources of the state. They were given wide distribution in northern and eastern cities visited by the 172 Oklahoma boosters on the 16-day tour. Representatives of several natural gas utility companies of Oklahoma were included in the party to expound the advantages of natural gas.

H. L. Costello, Standard Oil Co., "The LPG Business—What It Is and Who Does It."

R. C. Terradell, supervisor of sales training, So. Cal., "Training Program for Company and Dealer Salesmen."

Also scheduled for the program is "The Gas Industry Is On the Air," a radio stunt prepared by C. W. Capwell, San Diego Gas & Electric Co.

Entertainment features will be heavily emphasized. During luncheons, to be held around the hotel swimming pool, conventioneers will be treated to diving exhibitions and Mexican music. On Tuesday night, an exhibition Jai Alai game will be held in Ti Juana; Wednesday night, a boat trip around the bay is scheduled. Friday, following the convention, the traditional golf tournament will be held, with deep sea fishing for those who prefer angling.

Swigart Honored

Fifteen years of devoted service as Trade Relations Representative for the Pacific Coast Gas Association were observed July 1 at a dinner party given by PCGA at the Elks Club in Los Angeles for Carl A. Swigart, who went into retirement on that day.

High spot of the affair was the presentation by Henry Honer, chairman of the Manufacturers Section, of a gift check of $2500 to Swigart. The money was donated by members of the Manufacturers Section, of which Swigart had served as secretary.

Retrospection was the theme of entertainment which followed the dinner. Slides recalling the early days of Swigart's career and old Charlie Chaplin films were shown.

The party was planned by a committee headed by J. E. Kern, who has succeeded Swigart (GAS, Feb., 1947).

OTHER ASSOCIATIONS

Compact Meeting

The summer quarterly meeting of the Interstate Oil Compact Commission will be held in Great Falls, Mont., August 11-13, Chairman Hiram M. Dow has announced. Headquarters will be in the Rainbow Hotel.

A program designed to stress and encourage more effective oil and gas conservation in the western states is being planned.

A study of maximum efficient rates of production in the various states now is being made by the Commission's Regulatory Practices Committee, and Theo A. Morgan, Wichita, Kan., committee chairman, expects to

have report ready for submission at the Great Falls meeting. The survey is being made to determine whether it is practical and advisable to adopt general rules that may be used in all states in arriving at the maximum efficient production rates.

Montana became a member of the commission in 1945, and this is the first meeting of the compact to be held in the state.

SCMA Officers

New officers of the Southern California Meter Association recently elected are headed by Curtis C. Cortelyou, General Petroleum Corp., president; J. C. Groenewegen, Shell Chemical Corp., vice president; George H. Forster, Jr., The Texas Co., secretary-treasurer; and J. Andrew Waltman, Southern California Gas Co., auditor. Past president of the organization is Lee Cheever, Southern Counties Gas Co.

Committee chairmen are as follows:

Program—C. S. Beard, Southern California Gas Co.

Entertainment—James Gesner, Reliance Regulator Corp.

Membership—W. Frank White, Southern California Gas Co.

Publicity—Merrill Berkley, Berkley Eng. & Equip. Co.

Standards—J. A. Till, Southern California Gas Co.

By-Laws—James E. Adams, Signal Oil & Gas Co.

Instrumentation — Lawrence B. White, Wilshire Oil Co.

San Joaquin Valley—Ross T. Furlong, The Texas Co.

Mid-West School

Conducted by the Mid-West Gas Association and the Engineering Extension Service, Iowa State College, the 1947 Mid-West Gas School & Conference will be held Sept. 8 and 9 at Ames, Iowa. Exhibits of manufacturers, which have been eliminated for several years because of the shortage of materials and manpower, will constitute an important part of this year's conference.

The meeting will be opened with a general session on Monday morning, followed by sectional meetings Monday afternoon and Tuesday morning and afternoon.

Oklahoma Utilities

D. W. Reeves, Oklahoma Natural Gas Co., Tulsa, chairman of the gas division, Oklahoma Utilities Association, has announced that a one-day meeting of the division will be held at the Biltmore hotel, Oklahoma City, on Sept. 19.

Retiring President Thos. Weir (left) and incoming President F. A. Brownie are shown at the head table at the annual banquet of the Canadian Gas Association.

Brownie Heads Canadian Gas Association

F. A. BROWNIE, Canadian Western Natural Gas, Light, Heat & Power Co., Calgary, Alberta, was selected at the annual meeting of the Canadian Gas Association, held at the General Brock Hotel, Niagara Falls, Canada, June 9-11, to serve as president of the organization for the coming year. Over 300 gas men were on hand, exceeding attendance records for 40 years.

Highlight of the sessions was the showing and explanation by Peter Bruck of Peoples Gas Light & Coke Co., Chicago, of a 1200-ft. film on underground distribution work done through one-foot openings, which does away with expensive pavement cuttings. Some of the other topics discussed were "Employee Training Plans of the American Gas Association," by George H. Smith, AGA assistant managing director; "The Manufacturers' Responsibility in the Utility Business," by John A. Robertshaw, Robertshaw Thermostat Co.; and "The 'CP' Program for 1947-1948," by James I. Gorton, GAMA promotional director.

Following Brownie on the unanimously approved slate were E. H. Rohrer, British Columbia Electric Co., Ltd., Vancouver, 1st vice president; Alex Mackenzie, General Steel Wares, Ltd., Toronto, 2nd vice president; George W. Allen, gas survey engineer, Toronto, executive secretary and treasurer, and the following executive committee members:

Alan H. Harris, Jr., Winnipeg Electric Co.

G. W. Page, Montreal Coke and Mfg. Co.

Hugh G. Smith, Consumers' Gas Co. of Toronto.

K. L. Dawson, Nova Scotia Light and Power Co., Ltd., Halifax.

R. M. Perkins, Windsor Gas Co., Ltd.

C. M. Seiger, United Gas & Fuel Co. of Hamilton, Ltd.

Carl H. Lutz, Dominion Natural Gas Co., Ltd., Dunnville, Ont.

Wm. Vickers, Public Utilities Commission, Kitchener, Ont.

Thos. Weir, Union Gas Co. of Canada, Ltd., Chatham, Ont.

W. J. Pead, Jr., Quebec Hydro-Electric Commission, Montreal.

D. B. McWilliams, Dresser Mfg. Co., Ltd., Toronto.

J. M. Moffat, Moffats Ltd., Weston, Ont.

The association's constitution and by-laws were revised to provide for formation of a manufacturers section, composed of appliance and equipment manufacturers and distributor members of the CGA. D. B. McWilliams was named chairman of the new section, and J. M. Moffat vice chairman. An Advisory Council has also been established. This body is to be composed of still active past-presidents of the association, with the exception of those serving on the executive committee. This council will consider important problems which the executive committee refers to it.

Vancouver was tentatively selected as the meeting place for the 1948 convention. to be held in late June or early July. With offers of full PCGA cooperation already received, officials expect the Vancouver convention to be one of the best in CGA history.

EXPANSION

Experiment

Tennessee Gas to install centrifugal compressors in new station

TENNESSEE Gas and Transmission Co. has been granted temporary FPC authorization to construct near Morehead, Ky., an experimental compressor station consisting of centrifugal compressors driven by induction electric motors. The company will install a unit of three 3600-rpm compressors. Capacity of the station will be approximately 350 MMcf daily, with a suction pressure of 600 psi and a discharge pressure of 750 psi. Approximately 5500 hp of compression will be required.

Total cost has been estimated $477,000, which will include all the equipment, site, buildings and cottages for operating personnel. Should the new compressors prove unsatisfactory, substantial salvage can be expected from the materials, according to TGT. The cost of operation, exclusive of depreciation, was estimated at $280,000 annually, the bulk of which, $246,000, would be for electric power.

The company stated that construction should be completed by Dec. 1 and that the project will make possible a substantial increase in the firm's deliveries to the Appalachian area this winter.

TGT also announced that it has let contracts to Latex Construction Co. for 120 miles of 26-in. line in northern Mississippi and southwestern Tennessee, to Morrison Brothers for 90 miles in Tennessee and Kentucky, to Anderson Brothers Co. for 80 miles in eastern Kentucky, and to J. R. Horrigan Construction Co. for 70 miles in the Monroe, La., area. This construction will complete the company's 912-mile looping program, using 20 to 26-in. pipe.

Southeastward

Atlantic Gulf Gas Co. would carry gas to seaboard states

Atlantic Gulf Gas Co., a new company set up by United Gas Corp., Shreveport, has obtained SEC permission to build a pipe line system extending from Mississippi eastward to the Atlantic seaboard, passing through Alabama, Georgia, Florida and extending into southeastern South Carolina. The system will cost about $57 million, and United plans to spend an additional $17 million on its own installations for delivering gas to the subsidiary. About 1500 miles of lines are planned.

They will range in size up to and including 26-in., and one 9000-hp compressor station will be located near Andalusia, Ala. The estimated annual volume of natural gas for both city gate and direct industrial sales delivery has been placed at approximately 67 billion cu. ft.

In the meantime, a number of cities and towns are making plans to tap the proposed line. Live Oak, Fla., is considering the possibility of building a feeder line to the main carrying pipe. At Crestview, Fla., a county-wide meeting was held to work out details for a line to Crestview, Niceville and other Okaloosa county towns from a line serving Florala, Chipley and Bonifay. A preliminary survey to determine need for gas in Okaloosa county was assigned to Goodman Engineering Co. of Birmingham.

At Tallahassee, city officials met with United Gas representatives to discuss technical problems of substituting natural gas for the city's present manufactured gas system. United submitted a proposed contract to the city, but authorities took no immediate action, pending approval by the FPC of United's project.

Colorado Plan Okayed

The decision of the FPC Trial Examiner recommending that Colorado-Wyoming Gas Co. be authorized to construct facilities to transport natural gas to be received from Colorado Interstate Gas Co. has become effective as the final decision and order of the commission.

Facilities authorized include a mile of 16-in. line to connect with Colorado Interstate's new line from the Hugoton field, a 1200-hp compressor station to be built at the northern end of the proposed 16-in. line, and about 88½ miles of 8-in. and 11½ miles of 16-in. line extending from the new compressor station to the city limits of Cheyenne, Wyo. Cost of construction is estimated at $1,542,450.

Colorado-Wyoming proposed to use the facilities to transport gas from a new delivery point near Denver to the city gates of various towns in Colorado where it will be sold to public utilities for resale. A portion of the gas is also to be transported to Cheyenne Light, Fuel and Power Co. Construction was expected to be completed in 1948.

Texas Plans

United Gas Pipe Line Co., Shreveport, has filed an application with the FPC for authority to construct facilities to make more gas available in the Dallas area, to provide for increased loads, and to transport, sell and deliver natural gas to Texas Eastern Transmission Corp. near Longview, Texas. The company estimated construction costs at $1,730,000.

United proposes to lay 33 miles of 20-in. line from Carthage field, Texas, to a point near Longview to augment the delivery capacity to the Dallas area and to provide for anticipated increased demands there. The firm also proposes to transport through the new line 25 MMcf daily for Texas Eastern from Lone Star Gas Co.'s gasoline plant in the Carthage field and to sell to Texas Eastern approximately 100 MMcf daily at a delivery point to be established near Longview.

Lakin-Denver Progress

According to G. F. Brunston, general superintendent, Colorado Interstate Gas Co., about 80 miles of the company's 240-mile line from Lakin, Kan., to Denver, recently approved by the FPC, has already been completed. Final completion is planned for September. All surveys have been completed, pipe is unloaded and stacked, and 90% of the right-of-way has been acquired. The pipe was in the company's possession and most of it was strung even before the FPC approved the project.

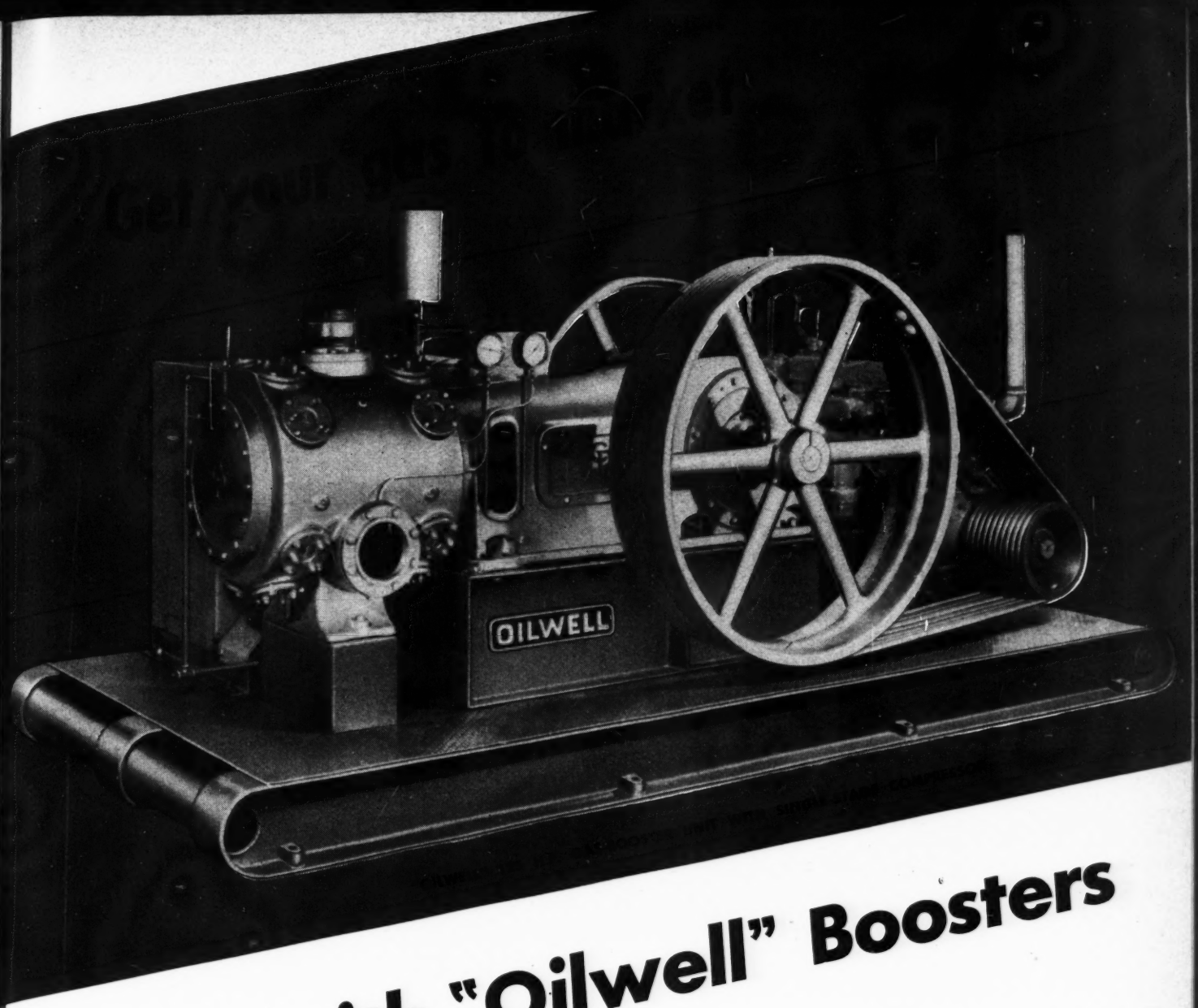
New Generator

Major expansion of the Clearwater, Fla., municipal gas plant has begun with the acceptance of an $88,000 bid for the purchase of a new generator which will increase production and permit extension of mains to suburban areas now lacking gas facilities. Delivery and installation was promised in about eight months. City Manager Boyd Bennett will supervise the installation.

The city has asked permission to build two municipally-owned gas tanks in Dunedin, Fla., to help serve this area, officials said.

Storage Planned

Michigan Consolidated Gas Co. has asked the FPC to authorize construction and operation of pipe line and storage facilities in Michigan for storage of gas obtained from Panhandle



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Eastern Pipe Line Co. or to determine that the FPC does not have jurisdiction over the facilities involved. Gas would be stored in the Austin field for subsequent distribution in the Detroit area. Under the existing contract, Panhandle is obligated to deliver a daily maximum of 125 MMcf and Michigan Consolidated proposed to take this amount substantially at 100% load factor, with storage scheduled to begin not later than April 1, 1948.

If the commission finds that it has jurisdiction, Michigan Consolidated requested authority for facilities to be constructed at an estimated cost of $1,014,000, ultimately to be acquired by Michigan-Wisconsin Pipe Line Co.

Coachella Franchise

A "notice of intention" to grant a franchise to Southern California Gas Co. has been passed by the Coachella, Calif., city council. No opposition to the granting of the franchise, which would provide Coachella with revenue amounting to 2% of gross annual receipts from the sale of gas, was voiced. The company proposes to tap the Texas-California pipe line to supply the desert town.

New Headquarters

Effective June 1, The American Meter Co. offices and plant were moved to a new location at 950 Tennessee St., San Francisco 7. An open house, during which visitors were invited to inspect the premises, was held on Aug. 1.

Loop Line

Work recently began on laying some 10-15 miles of line outside Meridian, Miss., looping a 6-in. Southern Natural Gas Co. line. The new installation will provide underground storage space and also will make 28,800 cu. ft. more gas available for use by the city.

REGULATION

FPC vs. Rizley Bill

Commission drafts counter measure designed to replace H.R. 2185

THROUGH June and July, the Federal Power Commission continued to hammer away at the task of defeating the Rizley Bill, H.R. 2185, which is designed to limit FPC's powers over production and gathering of gas. Having submitted to the industry at large a proposed general rule to define its jurisdiction, the rule to become a part of the Code of Federal Regulations (GAS—July, '47), the commission submitted to both House and Senate a draft of "appropriate legislative language" to be used in amending the Natural Gas Act.

The "language," which was requested by Chairman Charles A. Wolverton of the House Committee on Interstate and Foreign Commerce, was constructed by the commission with the intention that it replace the bill in its entirety.

The definitions of production, gathering, and transportation included in the FPC Bill would, the FPC thought, be clearer and less liable to confusion and controversy than those used in the Rizley Bill. The commission's measure contained substantially the same provisions as the previously publicized "general rule."

In a letter to Wolverton, FPC Head Nelson Lee Smith reiterated that the commission felt no bill should be enacted until after publication of Docket G-580, the Natural Gas Investigation. However, in view of the decision in the Interstate case, which gas men were fearful was going to be interpreted by the commission as carte blanche over production and gathering, the commission felt it wise to devise its own bill, he said.

Two awards, one for the best single newspaper advertisement, the other for a series of five or more newspaper advertisements, were presented to the Indiana Gas & Water Co., Indianapolis, in the recently completed Public Utilities Advertising Association contest. The winning selections were taken from 1400 entries submitted by utilities throughout the United States.

Presentation was made to George S. Diener, president of the company bearing his name, which prepared the winning ads. Diener is shown seated in the above photo, with Fred W. Dopke (standing, left), vice president, Indiana Gas & Water, and L. B. Schiesz, utility president.

PEPL Deliveries

Modification of an FPC order of April 23, extending beyond April 30 emergency service rules and regulations to govern deliveries of natural gas from Panhandle Eastern Pipe Line Co.'s system was announced recently. The modifying order provided that the extension shall be effective only until such time as reasonable and nondiscriminatory emergency service rules are filed by Panhandle as supplements to existing rate schedules, and accepted by the commission. If Panhandle fails to file such rules, the commission will, after hearing and by order, establish the rules. The hearing, if necessary, will be on Aug. 18.

The order further provided that in no event shall the present rules continue in effect beyond Sept. 30 without further FPC order.

Denver Lacks Code

A Denver apartment house explosion which resulted last June in total loss of a $20,000 building and the death of three people brought to light the fact that the city has been entirely without a gas plumbing code. The police, the city building department and the Public Service Co. of Colorado launched a three-way investigation to determine the cause of the blast. Lyle P. Webber, chief city building inspector, confirmed the absence of a gas plumbing code but said that one has been under consideration for some time.

Pending completion of the investigation, leaking gas was blamed for the explosion which demolished the 17 one-room apartments. A. A. Klinge, claims manager for Public Service Co., said the company was undertaking detailed tests with special instruments to determine whether or not there were gas leaks in the mains serving the building. A company emergency crew blocked off the main shortly after the explosion.

Ratable Take Bill Passed

Texas senate bill No. 431, designed to encourage ratable taking of gas in the Carthage field from all leases, has been signed by Gov. Jester. He stated that the bill authorizes the railroad commission, after notice and hearing,

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to determine the following gas field factors:

1. The lawful market demand of gas to be produced from each reservoir during the following month. 2. The volume of gas which can be produced from such reservoir in each well therein during the following month without waste. 3. If no waste is occasioned thereby, to permit wells in such reservoir to be produced in excess of the monthly allowable, provided (a) No well shall in any one month be permitted to produce in excess of twice its monthly allowable or to produce at a rate in excess of 25% of the daily producing capacity of such well as found by the railroad commission, (b) That any well that has produced twice its allowable for six successive months shall be closed until its production and allowable are in balance and (c) That the commission shall, on the first day of March and September of each year, restrict production from all wells that are then over-produced to such fractional part of their monthly allowable as will bring the accumulated allowables and accumulated monthly production in balance within the next six months. In like manner the commission may permit under-production for a period of six consecutive months and may allow the accumulated under-production to be produced, in addition to the legal monthly allowable during the following six months' period.

Flare Gas Feud

Oil companies opposing the Texas Railroad Commission's order closing the Seeligson field until beneficial use is made of flare gas told the Texas supreme court that they are "extending open arms" to federal control of oil. The argument, defending the commission's order, was voiced by Atty. Gen. Price Daniel, who said that the daily burning of more than 30 MMcf of casinghead gas daily in the field is an unlawful waste of natural resources and should be stopped by approval of the order.

Supplement Approved

A supplement to Panhandle Eastern Pipe Line Co.'s rate schedule, providing for a variable decrease in the volume of natural gas which Panhandle is obligated to deliver to Ohio Fuel Gas Co. on a firm basis, has been approved by FPC. By an order of Nov. 5, 1946, the commission suspended the supplement until April 9, 1947, on the basis that the change of service would result in Ohio Fuel's being charged firm service rates for interruptible service. On June 30 Panhandle requested that the supplement be permitted to go into effect.

Under a schedule effective since February, 1945, Panhandle has been obliged to deliver 50 MMcf daily to Ohio Fuel. The new schedule demands delivery of the first 25 MMcf daily and leaves to Panhandle's discretion the determination of volumes to be delivered above the first 25 MMcf. The commission stated that although its opinion in the matter has not changed, it approved the supplement because of the temporary nature of the emergency.

Natural Gas Pipeline Co.

The FPC has accepted for filing service rules providing for allocation of the system capacity of the Natural Gas Pipeline Co. of America to its customers in Nebraska, Kansas, Wisconsin, Illinois and Iowa. These rules, which represent the first attempt made by any natural gas company to establish a permanent basis for the allocation of available gas to customers, provides for changes in system capacity and establish maximum amounts of gas which each distributor may expect on a peak day.

The rules provide that the company shall submit periodic information to each buyer stating estimated maximum daily quantitities of gas to be available to him during the following year. Provision has also been made for new customers. The 1947-48 capacity available for allocation is estimated at 400,-100,000 cu. ft. per day.

Rosslyn Investigation

Gas rates charged by the Rosslyn Gas Co., which recently changed from artificial to natural fuel, are being studied by the Alexandria (Va.) city council, which took under advisement a request from the Arlington Public Utilities Commission for an investigation.

Lawrence S. Knappen of the PUC said rates charged by Rosslyn average twice those of eight comparable cities in Virginia, Ohio and Pennsylvania. He pointed out that in most cities it is customary to follow a changeover to natural gas with a rate reduction.

Rochester Asks Rehearing

Rochester (N. Y.) Gas & Electric Corp. has filed an application for a hearing before the Public Service Commission on its $50 million financing program which has been snagged by commission-prescribed conditions termed as "unacceptable." The utility did not reveal any details as to what these conditions are.

Scheduled issuance of securities has been postponed, the company stated, but the construction program, on which $22 million is to be spent in the next two years, will not be interrupted. Temporary short-term borrowing will be used to finance this work.

Wimberly Elected

Harrington Wimberly of Oklahoma has been elected vice chairman of the Federal Power Commission, succeeding Richard Sachse of California, who resigned because of ill health. Wimberly was appointed to the FPC in October, 1945, for a term expiring in June, 1948. He is owner and publisher of the Altus, Okla., "Daily Times Democrat."

FINANCIAL

Coal Pinch Passes

New contracts relieve pressure on producers of manufactured gas

The new contracts for coal workers gave the manufactured gas industry reason to breathe more easily. An AGA survey conducted in June revealed that companies had stock piles of coal and coke on hand and in transit sufficient for about 35 days' operation—considered enough to carry through any short term strike on at least a partial operating basis, but hardly enough for any protracted layoff.

Some small companies, it was learned, had only 16 days' supply on hand, while others had as much as 76.

With the threat of a strike looming at the time the survey was made, industry leaders were putting their heads together in an effort to apportion existing stocks of solid fuels, as well as to devise means of putting substitute materials to work.

Review Granted

The Memphis Natural Gas Co. has been granted a review by the Supreme Court of a decision that it is liable for payment of Mississippi's franchise tax on corporations.

Mississippi courts ruled that the company owes about $10,200 franchise tax for 1942 through 1944.

The company, a Delaware firm with main offices in Memphis, Tenn., owns a pipe line from Monroe gas field in Louisiana to Memphis. About 135 miles of its extension is in Mississippi.

The company contends it is engaged in interstate commerce and the tax violates the commerce clause of the Constitution.

Domestic Coke Rates

The sale of coke for domestic home use will have to remain on a curtailed basis if gas rates are to remain at their present levels, according to the sales agency for Citizens Gas & Coke Utility. The decision came up recently when Indianapolis, Ind., officials sought a larger source of coke for home use as a means of easing the smoke nuisance.

It was explained that coke sold for industrial uses brought a higher price, $14.50 a ton, as compared to $9.75 to dealers in coke distributed for home use. Utility officials take the position that since most Indianapolis homes are heated with gas, it is believed to be more equitable to keep the price of gas down and to continue to obtain the premium price for industrial coke.

$6.5 Million Loan Sought

National Fuel Gas Co., New York, has applied to the Securities and Exchange Commission to borrow not in excess of $6.5 million from Chase National Bank of New York to make advances to two subsidiaries for construction purposes. The parent company will loan up to $5 million to United Natural Gas Co., Oil City, Pa., and $1.5 million to Iroquois Gas Corp., Buffalo.

United has contracted for purchase from Texas Eastern Transmission Corp. of 30 MMcf of natural gas a day through the "Big Inch" and "Little Big Inch" pipe lines at the terminus of a proposed pipe line to be constructed by United. About 75% of funds to be obtained by United from its parent will be used to construct this pipe line, a distance of about 71 miles to connect with "Big Inch." Iroquois will use proceeds of loans for additions to its natural gas system.

32 Wells Sold

H. W. Snowden, of Dallas, and associates have signed contracts to purchase 32 producing oil and gas wells in four south Texas fields from H. H. Howell, of Alice, Texas, for a total consideration of approximately $2 million. The deal involves approximately 2500 acres of leases with the oil wells and 1200 acres with the three gas producers.

Westchester Rate Boost

Notices that a proposed schedule of increased rates for illuminating and heating gas—the first since 1921—has been filed with the Public Service Commission were mailed Thursday to the 155,000 customers of the Westchester Lighting Co., New York. The proposed schedule would reduce existing differentials in three zones.

EMPLOYEE RELATIONS

Cease Firing

Union fails to win strike, recognition from company, in Indianapolis walkout

The two and one-half month old strike of 400 members of the United Gas, Coke & Chemical Workers Union, CIO, against the Citizens Gas & Coke Utility of Indianapolis, Ind., was ended June 20. The strike began April 2, when the union attempted to obtain recognition from the company, following the alleged discharge of several employees by the company for union organization activities.

Ira Williams, international representative of the union, announced that the strike had been lost by the union, but that every effort to obtain reinstatement of members as employees of the company would be made. Thomas L. Kemp, utility manager, said that the striking union employees, who have been replaced, would not be rehired.

Union charges of mismanagement are still pending in circuit court against the management.

Utility Labor Laws

Ten states have now passed special utility labor laws, which fall into four patterns: (1) State seizure plus "cool-off" and negotiation provisions. (2) Compulsory arbitration. (3) Special industrial court. (4) Simple antisabotage laws.

New Jersey and Virginia have state seizure laws, the latter a unique arrangement for a service charge for state management. Gov. Driscoll of New Jersey, acting under the antistrike law for public utilities, recently took over for state operation gas plants at Camden and Glassboro, properties of Public Service Electric & Gas Co., to prevent a walkout of 450 employees.

Compulsory arbitration statutes have been enacted in Florida, Indiana, Michigan, Pennsylvania and Wisconsin. The new Missouri setup provides for a special utility labor regulation board. A somewhat similar Court of Industrial Relations is established in Nebraska. Michigan (in addition to its utility compulsory arbitration law) and Texas have passed stringent laws against sabotage during utility strikes.

Reservists to Draw Pay

President Britton I. Budd, Public Service Co. of Northern Illinois, has issued an executive order announcing company cooperation to the fullest extent practicable with the employees who are members of, or are considering membership in, the National Guard or an active reserve group of the armed forces. The plan provides a maximum leave with pay of 15 calendar days within a given year for employees who have served the company for one continuous year. Other provisions state that the employee must retain all compensation received for military service and that the time off with pay shall not be deducted from any vacation.

ON THE NOSE - $1

With a horse racing theme, the recently revived "tip plan" of the Portland (Ore.) Gas & Coke Co., which pays employees and their families for gas appliance sales prospects submitted by them, got off to a fast start last spring. In two months, April and May, $427 was paid for 350 range and water heater sales made during those months to prospects not previously on the records of the commercial department.

Tips submitted totaled 981, a figure which was boosted to 1141 by the fact that some were both ranges and water heaters, the only appliances at present included in the plan.

"Pay-off" is at the rate of $1 net, with the company paying the additional 25 cents to the government for income tax. Each employee is provided with a book of "dope sheets" for reporting prospects to the company. If a sheet is checked for only one appliance and two are sold, full credit is given for both. A prospect is good for 60 days.

Disaster In Vermont

PROPANE FILLS IN AFTER FLOODS DESTROY GAS PLANT

EARLY in June flood waters which reached a peak of 12 to 15 ft. in height literally swept away most of the properties of the Central Vermont Public Service Co. water gas plant, which supplied approximately 3500 Rutland, Vt., customers. Water from East Creek was running about 2 ft. deep in the combination gas plant, transformer sub-station and operating offices, when a 3½-in. rainfall caused the East Pittsford power dam, about six miles above Rutland, to break. The peak of the flood hit with such force that many homes and buildings were torn from their foundations, including the utility's meter house, compressor house and purifiers, which were completely removed, and other company buildings which had walls torn out and foundations undermined.

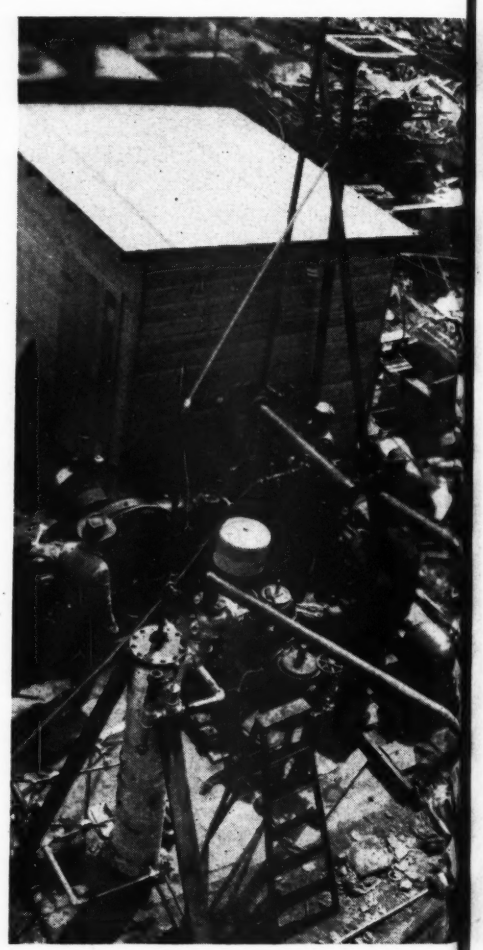
This was once a gas plant. The brick building which housed it was carried away by the 15-ft. flood which swept Rutland, Vt. In its place rests remnants of somebody's home.

The Rutland D & H railroad passes out of the city on an embankment about 25 ft. high, with a double track railroad bridge over East Creek. This high land is on the west side of the creek, and the public service company property was located just a few feet above normal creek level on the east side. As a result of the dam effect of the railroad embankment, the main currents of the flood were directed through the utility company property, causing severe damage.

After the flood, the city was without electricity, water and gas. Since it appeared that it would be some time before the water gas plant could be put back into operation, George W. Peck III and A. E. Shippee, in charge of gas operations for Central Vermont, sought help from H. Emerson Thomas and Associates of Westfield, N. J., in obtaining a propane-air plant to restore service. Within 24 hours Thomas and Paul E. Peacock, Jr., manager, Martinsburg (W. Va.) Gas and Heating Co., had inspected the damage and ordered the shipment of equipment necessary for the conversion.

New Equipment

The boilers and holders of the water gas plant not damaged by the flood were utilized, but a 60,000-cu. ft. per hour Selas gas-air mixing machine, a steam-fired propane vaporizer, and small accessory equipment were shipped in by truck or air express. Propane was brought in by tank car



Emergency gas-mixing machine for propane-air plant, which was operating within six days after disaster, is shown being set up.

Some Homes will have Limited Gas Service Today

When inspection of our gas plant before daybreak Wednesday morning showed that virtually all fuel had been lost and the equipment heavily damaged, it was apparent that it would take a long time to rebuild the plant so gas could be manufactured again. Immediate action was begun on an alternative plan to bring liquified petroleum gas in by tank car and assemble gas mixing machinery to furnish emergency gas service more quickly.

IMPORTANT: Some Appliances Can NOT Be Used

PLEASE READ CAREFULLY:

1. This is EMERGENCY service which is started so people will be able to cook on TOP BURNERS.
2. SOME GAS APPLIANCES CAN NOT BE USED SAFELY until individually inspected and approved by the Company. The following can NOT be safely used:
   - Gas refrigerators.
   - Gas water heaters.
   - Automatic-lighting ovens on gas ranges.
   - Such other burners as may be designated.
3. UNDER NO CONDITION CAN ANY CUSTOMER SAFELY TURN ON HIS OWN GAS, or attempt to use it if it has not been shut off. IF YOUR GAS HAS NOT ALREADY BEEN TURNED OFF, TELEPHONE THE CVPS OFFICE (RUTLAND 2600) AND A MAN WILL BE SENT TO TURN IT OFF.
4. A Company employee will call on each customer to turn on his gas service, and at that time WILL TAG EACH BURNER AND APPLIANCE WHICH CANNOT BE SAFELY USED. A record will be kept of each burner and appliance tagged.
5. Tagged burners and appliances are NOT to be used under any conditions. A Company employee will call back, at the earliest date possible, to remove the tag when use of the appliance or burner can be safely resumed. The necessary inspection of these burners and appliances will be accomplished as follows:
   a. After emergency top-burner cooking has been restored, Company employees will individually check each gas refrigerator and restore it to operation.
   b. After these two essential services (top-burner cooking and refrigeration) are restored, other tagged appliances and burners will be checked.
6. It will be appreciated if customers will NOT call for information as to when tags will be removed. Such calls cannot speed removal of tags and might cause delay.

When Emergency Gas Service Can Be Expected

Work has now progressed to the point where we can forecast the start of EMERGENCY gas service as follows:

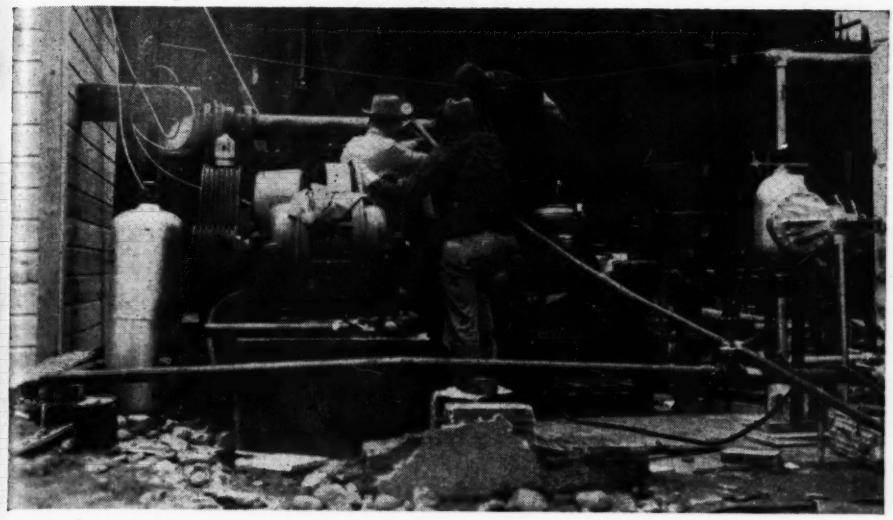
1. Gas service will be restored to SOME homes today.
2. Service to additional customers will be restored progressively over a period of several days as individual situations are clarified.
3. It is known now that three sections will be without service for a longer period. These three sections are:
   a. The area west of East Creek which was served by the gas main across the Crescent Street bridge which was washed out.
   b. The area west of East Creek on West Street formerly served by the gas main on the West Street bridge which was washed out.
   c. The flooded area itself.

FOR SAFETY REASONS, THE LIMITATIONS SHOWN ABOVE ARE NECESSARY AS EMERGENCY GAS SERVICE IS STARTED.

June 10, 1947

CENTRAL VERMONT Public Service CORPORATION

Notice sent to homes when gas service was partially restored. Spot radio announcements were also utilized to keep customers posted on progress and to warn against their trying to turn on gas themselves.



Holder, one of few regular facilities still standing after flood, forms background for emergency equipment, shown being installed in midst of destroyed water-gas plant.

for temporary use until the storage tank could be shipped in and installed.

Approximately 300 ft. of 2-in. welded line had to be laid from the tank car to the vaporizer. All of this was run from 20 to 30 ft. overhead and across building roofs to avoid interference with the bulldozers, steam shovels and cranes cleaning up the vast amount of debris on the ground. Many of the plant lines were washed out and at two points in the distribution system where bridges were destroyed, mains were also lost and filled with water. Repair work on these units was completed on the same day that the plant started making gas.

Surrounding gas companies assisted in the turn-on of customer services and helped make possible the restoration of service in a considerably shorter time than contemplated. Servicemen from Montpelier, Brattleboro, Barre, Bennington, Burlington and Springfield, Vt., Claremont and Manchester, N. H., and Albany, N. Y., assisted. Thomas and the local gas executives worked against obstacles with little time for rest, in order to speed the job.

Method of Make

The method of make was to take liquid from the storage tank through the 2-in. line into the vaporizer, where it was converted to vapor of about 2500 to 3700 Btu's per cu. ft. This holder throws approximately 4 in. of water column and thus furnished the gas supply for the inlet to the mixing unit. The propane-air mix was then made into the storage holder for distribution to the consumers. Gas was made into the holder on the sixth day after H. Emerson Thomas and Associates were called in, and then Central Vermont's service department began turning on the customer services which had been turned off immediately after the flood, first giving the customers use of their top burners. All appliances of the automatic type were tagged to be left turned off until the serviceman could make the proper adjustments and see that no pockets of air were affecting the operation of such automatic appliances.

The procedure used in order to get an exchange gas of propane-air for the previously used water gas was to install a range taken directly from the mains, without changing the burner adjustment. It was placed in a small temporary building adjacent to the new propane-air gas plant, making gas of proper Btu to burn without adjustment of the burners. This was done so that as the service department turned on the range top burners, no adjustment at that time would be necessary, and the servicemen could turn on the maximum number of ranges per day. The Btu of the substituted gas was approximately 650, in comparison to the previous 540-Btu water gas. A calorimeter was also installed in the temporary building adjacent to the propane-air gas plant. This was a new unit trucked in by American Meter Co., as the plant calorimeter was lost in the flood.

Spot radio announcements were used as warnings when emergency gas was finally turned into the mains. Consumers were urged not to turn on or use gas for any purpose until a serviceman had checked the appliances.

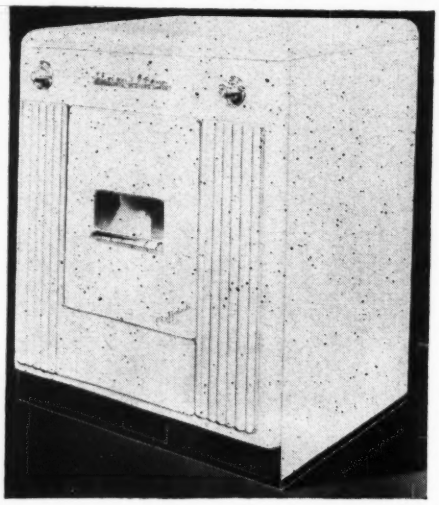
Safety Briefs

LINEWALKERS

1. Wear clothing which will afford protection against thorns and snakes. The snake bite kit and first aid kit should be carried on all walks.
2. Never trust a boot or legging in case a snake strikes. Always remove clothing or boots and if there is the slightest break, use snake bite kit and as soon as possible see a doctor.
3. Never use matches or open flames in a gate box or meter station. Smoking is prohibited in such locations.
4. Test all cables, poles, foot-logs, etc., over high and dangerous creeks before using them.
5. Do not eat fruit or vegetables when passing through orchards without first getting permission and asking if fruit has been sprayed for insects.
6. Avoid drinking water from springs or shallow wells.
7. Carry a spool of light copper wire on all walks to permit shorting of telephone line in case of serious injury.

From The Southern Natural Gas Co.
Birmingham, Ala.

Hamilton Automatic Clothes Dryer



Manufacturer: Hamilton Manufacturing Co., Two Rivers, Wis.

OPERATING on manufactured, natural, mixed or bottled gas at an input rate of 20,000 Btu per hour, the Hamilton model No. 700-G automatic clothes dryer does wet, damp-dry or bone dry finishing. The clothes are placed in a slowly revolving perforated drum. Baffles in the drum carry the clothes to the top of the drum, and they float downward through a pool of warm, clean, moving air, which is thermostatically controlled.

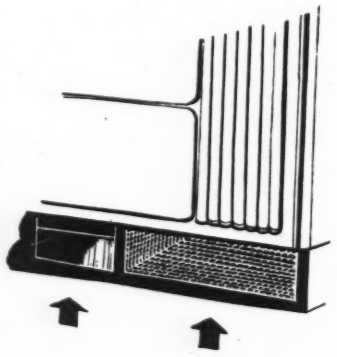
A timer switch (on the upper front panel) turns on the electric motor and fan, puts the drum into motion, governs the length of time the gas burner will operate, and permits the drum to revolve for five minutes after the large burner is shut off, thus cooling the clothes.

The manually operated switch (on the front panel) controls an electric lamp which floods the interior of the drum with light. This light and the glass window in the door inform the operator whether the drum is in motion and whether there are clothes in it.

Heat is generated by a gas burner equipped with a thermostat, magnetic valve, safety pilot control, and pilot burner. A ½-in. I.D. gas supply line is required. A 1/6-hp. electric motor drives the drum, and by means of a fan circulates air through the air intake and exhaust chambers and ducts. The moisture laden air is directed outward through the exhaust duct and a removable lint catcher located at the right in the base of the dryer. The air intake opening is at the left of the lint catcher. Some of the selling points to be emphasized are the following:

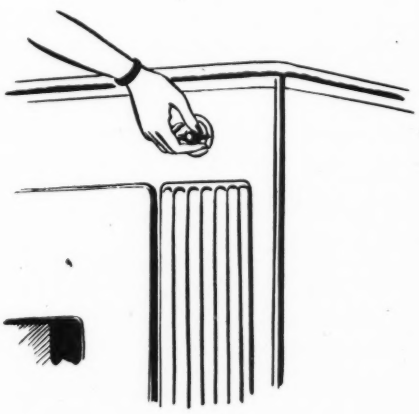
1. Weather uncertainties are eliminated.
2. There is no worry over dust, smoke or soot that soil clothes on the line.
3. Carrying baskets of heavy, wet clothes to the line is unnecessary.
4. Fading of colored fabrics is avoided.
5. The Hamilton guarantee protects against faulty workmanship or defective materials for a period of one year.
6. Much time is saved since an average washer load dries in 15-25 minutes (6 lbs. of dry clothes or 12 lbs. of wet).
7. No oiling or greasing is required.
8. Rigidly constructed of heavy gauge furniture steel, the cabinet is finished in high lustre baked white enamel (claimed to resist chipping, cracking, peeling or staining) with red plastic and chrome trim.
9. Loading door, drum and burner housings are fully insulated. Double wall construction with rubber gasket jamb prevents heat loss.
10. Installation is simple, since in most localities regulations will not require venting the oven in the dryer to a flue. When the oven must be vented, a draft diverter or hood should be used.
11. Practical locations for the dryer, which is an attractive furnishing in itself, are the basement laundry room, utility or laundry room adjacent to the kitchen, or the laundry center in the kitchen. The washer, dryer and ironer can be arranged to form a compact, convenient working unit requiring minimum space and travel distance.
12. At the front of the dryer, toe space 4 in. high and 2½ in. deep from the face of the door is provided.

Overall dimensions are: height, 39 in.; width, 31 in.; depth, 27½ in. The drum is 26 in. in diameter, 17 in. deep, and operates at 50 rpm. Electrical connections required are: 110-120 volt A.C. 60 cycle, 200 watt electric line.



Removable lint duct and exhaust duct through which moisture laden air is directed outward. Room ventilation aids in removing moisture thus discharged. The opening at the left is the air intake.

Loading the drier. An ordinary washer load of clothes can be dried while the next load is being washed, in 15 to 25 minutes. The door is at a convenient height to facilitate loading and unloading.



Timer switch. It turns on the electric motor and fan, starts drum in motion, governs length of time burner will operate, permits drum to operate for five minutes after burner is off, to cool clothes.

FRANCHISED DISTRIBUTORSHIPS NOW AVAILABLE

Here's your opportunity to sell the complete Heatway appliance line in an exclusive protected territory!

THE coupon on the bottom of this page may be the real chance you've been waiting for. A chance to build a solid money-making future around a big profitable line of heating products that you, *and you alone*, can distribute throughout a large protected territory!

Heatway is the brand that stands for new engineering design, better product features, smart styling, aggressive promotion and advertising... and millions of dollars in factory and production facilities.

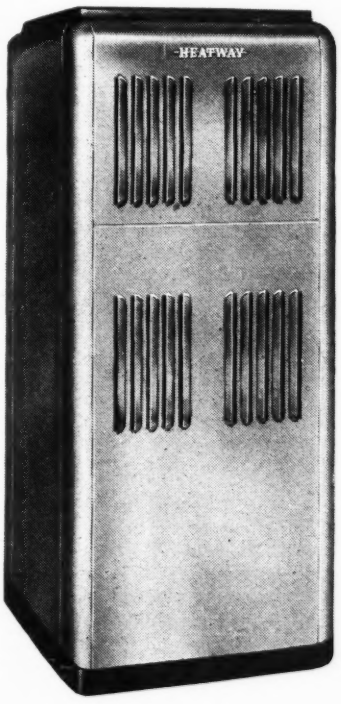
A Heatway franchise gives you a complete line of heating products from one giant source. You get warm air furnaces, stokers, winter air conditioners, console heaters, floor furnaces, oil burners, blowers and filters—in *all* sizes, for all fuels!

You can order assortments of merchandise and get a 5% discount on every carload lot. Because you purchase from *one source*, you get this big, easy margin.

You get national advertising support that pays off in local sales . . . and you get an additional 2% advertising allowance on earned invoices.

You can attract dealers with the Heatway Floor-Finance plan that permits them to stock a full line of appliances with only a 10% cash investment.

Yes—we have a great proposition for the right men. Let's discuss it. Just mail the coupon today.



HEATWAY Automatic Warm Air Conditioner

We hired a famous industrial designer to style it. We had research engineers knock out all the "bugs". We tested it in the field against service and installation headaches. We put it on mass production lines that can turn it out as fast as you want, *as many as you want.* That's the story behind this and every Heatway product for every home, every fuel!

HEATWAY
Home Heating Appliances

HEATWAY
Dept. H-A1, 20 West 43rd St.
New York 18, N. Y.

I'll listen to your proposition.
No obligation, of course.

Name_____

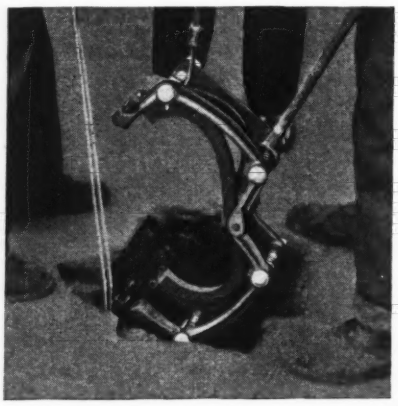
Firm_____

Address_____

City_____ State_____

NORMAC
BELL JOINT CLAMP

6 inch NORMAC clamp being lowered into hole for installation

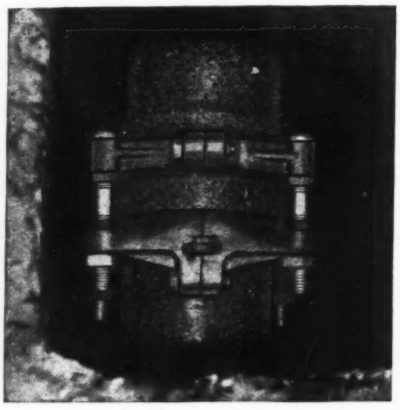


Solves Your Joint Repair Problems

- QUICK
- EASY
- PERMANENT

Installed in pavement openings 1' x 1'. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp... often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Write for literature illustrating this simple solution to one of the Gas Industries most trying problems and ask for our catalog describing our complete line of

6 inch NORMAC clamp in service after installation



COUPLINGS... FITTINGS
SERVICE TEES and ELLS
SLEEVES ... COMPRESSION-END COCKS... COMPRESSION-END METER BARS

NORTON-McMURRAY MFG. CO.
39 SOUTH LA SALLE ST. ● CHICAGO 3, ILL.
Method and product covered by U.S. Patents, Nos. 2,163,261 and 2,178,286.

CONNELLY IRON SPONGE

For Real Gas-purifying Power

● To get top efficiency in gas-purification at the lowest cost, use Connelly Iron Sponge. It's the finest purification material to be had.

Connelly Iron Sponge has a high degree of activity. It gives longer service before fouling. It revivifies more quickly. Leading gas companies have been using this "blue-ribbon" purification material for years — they know it can be relied upon to do the best job.

If you have a problem in gas-purification, take advantage of Connelly's 71 years of experience. Our engineers will be glad to help you . . . there is no obligation. Consult Connelly!

CONNELLY, INC.
3154 S. California Ave., Chicago 8, Illinois
Elizabeth, N. J. Los Angeles, Calif.

SALES SLANTS

"Gas Has Got It!" In 98 Million Messages To Push "CP" Range

Ninety-eight million AGA-sponsored automatic "CP" gas range messages, most of them carrying the new industry slogan, "Gas Has Got It!" will reach the public through 10 national magazines during October, November and December of this year. The campaign has been designed to dispel quickly any and all misconceptions in women's minds regarding the superior qualities of automatic gas ranges.

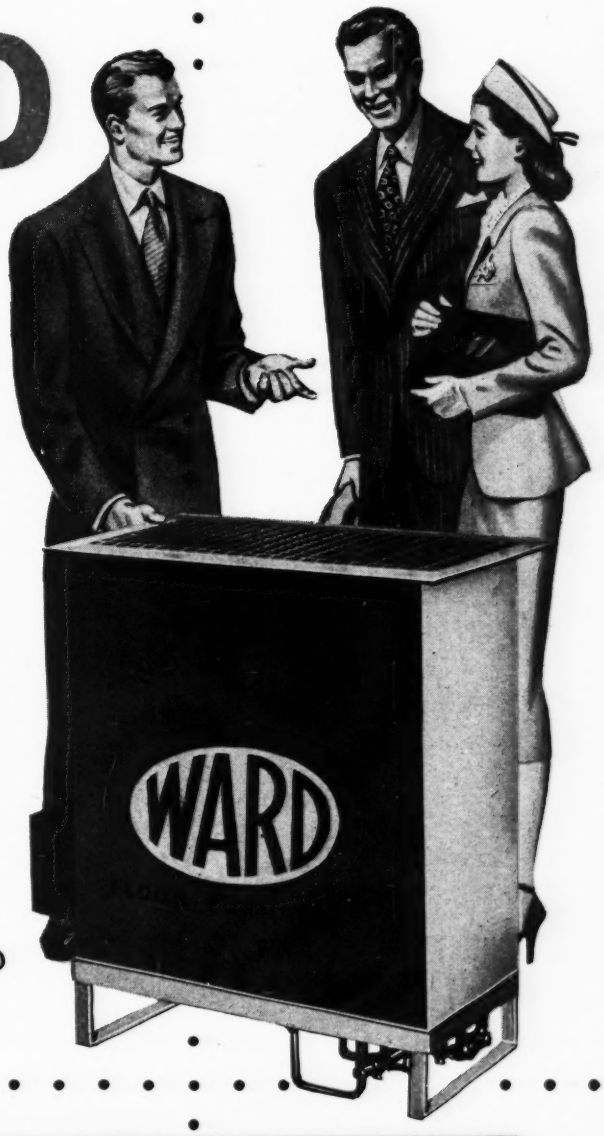
According to facts obtained by Elmo Roper, in a survey undertaken at the request of AGA, women prefer a gas range 8.7 to 1, and when they describe characteristics of the next range they plan to buy, they actually describe the "CP" gas range. The "CP" has each of these nine points, which the survey revealed that women will shop for: (1) Best automatic features. (2) More modern conveniences. (3) Easy to keep clean. (4) Easiest to cook with. (5) Cooks foods better. (6) Cooks things quicker. (7) Cool in operation. (8) Costs less to run. (9) Costs less to buy new.

AGA is alloting $200,000 to the campaign, and hundreds of local gas companies which will plan tie-ins are expected to direct $600,000 of their budgets toward the industry-wide effort. AGA's aim is to make the drive a "million-dollar baby." Kits are being prepared for local use, and 21 tie-ins are suggested by AGA. They include the following: newspaper mats, photo-prints of original art for ads, window display pieces, banners and streamers, range display pieces, counter display cards, outdoor posters, car cards, truck-panel designs, blow-ups of national ads, envelope stuffers and pick-up pieces, radio commercials, postage meter slugs, sound motion picture "Winning Seals of Approval" in full color, newspaper publicity stories, consumer range booklet "Food is Fun," home service tie-ins, New Freedom Gas Kitchen promotions, "CP" range sale tags, sales training helps, and teachers' range manual "Automatic Gas Cooking."

CINCINNATI GAS & ELECTRIC CO. has won national awards in the Better Copy Contest of the Public Utilities Advertising Association for the 26th consecutive year. CG&E's awards were in the classification of window displays and outdoor advertising. The winning window display dramatized methods of electric distribution, and the outdoor advertisement had "Leave a 'light-watchman' on guard when you go out," as its theme. The company also received honorable mention for its entries in the group featuring a single newspaper advertisement promoting the use of electric service and in the annual report to stockholders class.

WEISS & BESSERMAN CO., INC., of New York, recently celebrated the 10th anniversary of the firm's association with Youngstown Kitchens. Weiss & Besserman, claimed to be the nation's largest exclusive distributors of kitchen

WHEN YOU SELL THE WARD



you are offering...

- a well-known product with a *38-year old reputation* for dependable service
- a product with *exclusive* sales features
- a product with a *10-year guarantee* behind it
- a product with *thousands of enthusiastic owners* right in your territory

No other furnace on the market can offer you all the advantages that you have with WARD

WARD HEATER COMPANY

1800 W. Washington Boulevard • Los Angeles 7, California

Since 1909

WARD

FLOOR FURNACES

equipment, became New York agents for Youngstown in 1937. Their headquarters have become a kitchen showplace which more than 10,000 people from all over the world visit annually. The firm and its dealers have just completed a joint advertising campaign for Youngstown, using full page ads in metropolitan and local newspapers in the area. It is said to be the first such campaign conducted exclusively for kitchen equipment.

NATURAL GAS COMPANIES serving the Greater Pittsburgh area have sponsored a series of local newspaper ads emphasizing the advantages of gas for cooking and refrigerating, and calling attention to New Freedom Gas Kitchens. The campaign was handled by Ketchum, MacLeod & Grove, Inc.

AMERICAN STOVE CO. has published a 23-page book, "Half a Century in Harvey," commemorating the establishment of the Harvey (Ill.) Division in 1897. A foreword by Harold B. Isaac, manager, Harvey Division, is followed by a history of the division and its personnel throughout its 50 years of operation.

HOUSTON NATURAL GAS CO. is cooperating with schools on its lines by assisting them, through local dealers, to obtain the best possible equipment for their plant facilities, with particular reference to the installation of modern gas appliances in their home economics departments. Last fall the sales promotion and the residential and commercial sales departments launched a campaign to obtain special allotments of appliances from manufacturers. The plan provides a procedure whereby gas cooking and refrigerating units in the schools will be replaced every two years with current models, at no cost to the schools.

AMERICAN RADIATOR & STANDARD SANITARY CORP. is planning a big fall or winter campaign to advertise its new baseboard radiant panels which will be produced in two models. Type R will be a radiant panel and type RC a radiant-convector panel. They are 8 in. high, 2 in. thick and 12 or 24 in. in length. The panel fits snugly against the wall when installed or can be partially recessed, saving additional floor space. D. D. Couch, general manager of sales, has stated that the new panels soon will be available for shipment.

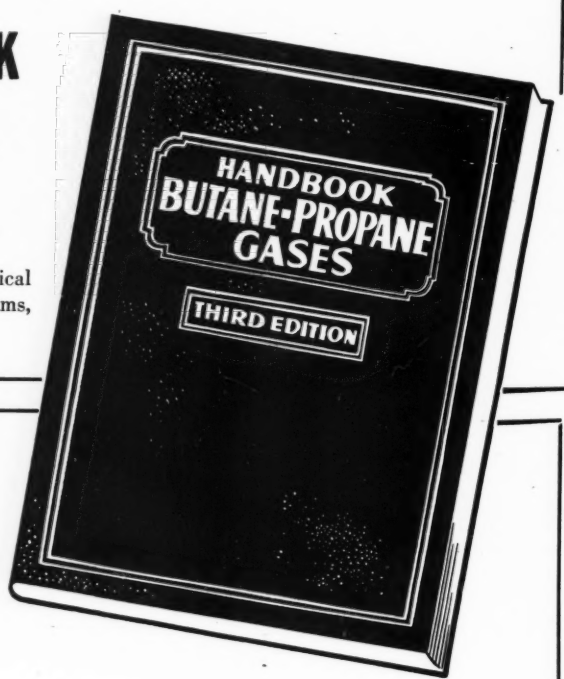
AGAIN AVAILABLE!

HANDBOOK

BUTANE-PROPANE

GASES

352 PAGES of Technical Facts, Charts, Diagrams, Photographs.



Order Your Copy Today

$5.00 per copy

We pay postage on orders accompanied by remittance. (In Calif. add 13c sales tax.)

Partial Contents:

INTRODUCTION
LP-Gas - What it is, it's History and Progress in Industry.

PHYSICAL AND CHEMICAL PROPERTIES
Volume Correction Factors. Analytical Determination and Testing.

PRODUCTION OF LP-GAS
Natural Gasoline Plants, Recycling Plants, Oil Refineries.

TRANSPORTATION AND STORAGE
Design of Containers. Pumping Systems. Delivery by Truck, Rail, Water or Pipe Lines.

DISTRIBUTION OF LP-GAS
Installing and Servicing LP-Gas Systems from Bottled Gas to Central Plant Multiple Utilities.

UTILIZATION OF LP-GAS
Comparative Performance with Other Fuel. Domestic and Industrial Applications. Enrichment, Peak Load and Standby Uses.

REGULATIONS
N.B.F.U. Pamphlet No. 58 (1947) Marine, Motor Carrier and Freight Regulations.

APPENDIX
Insurance. Interchangeability of Gases. Tables for Field Use. Flame Weeding. Bibliography and Glossary.

GAS

1709 West Eighth Street
Los Angeles 14, Calif.

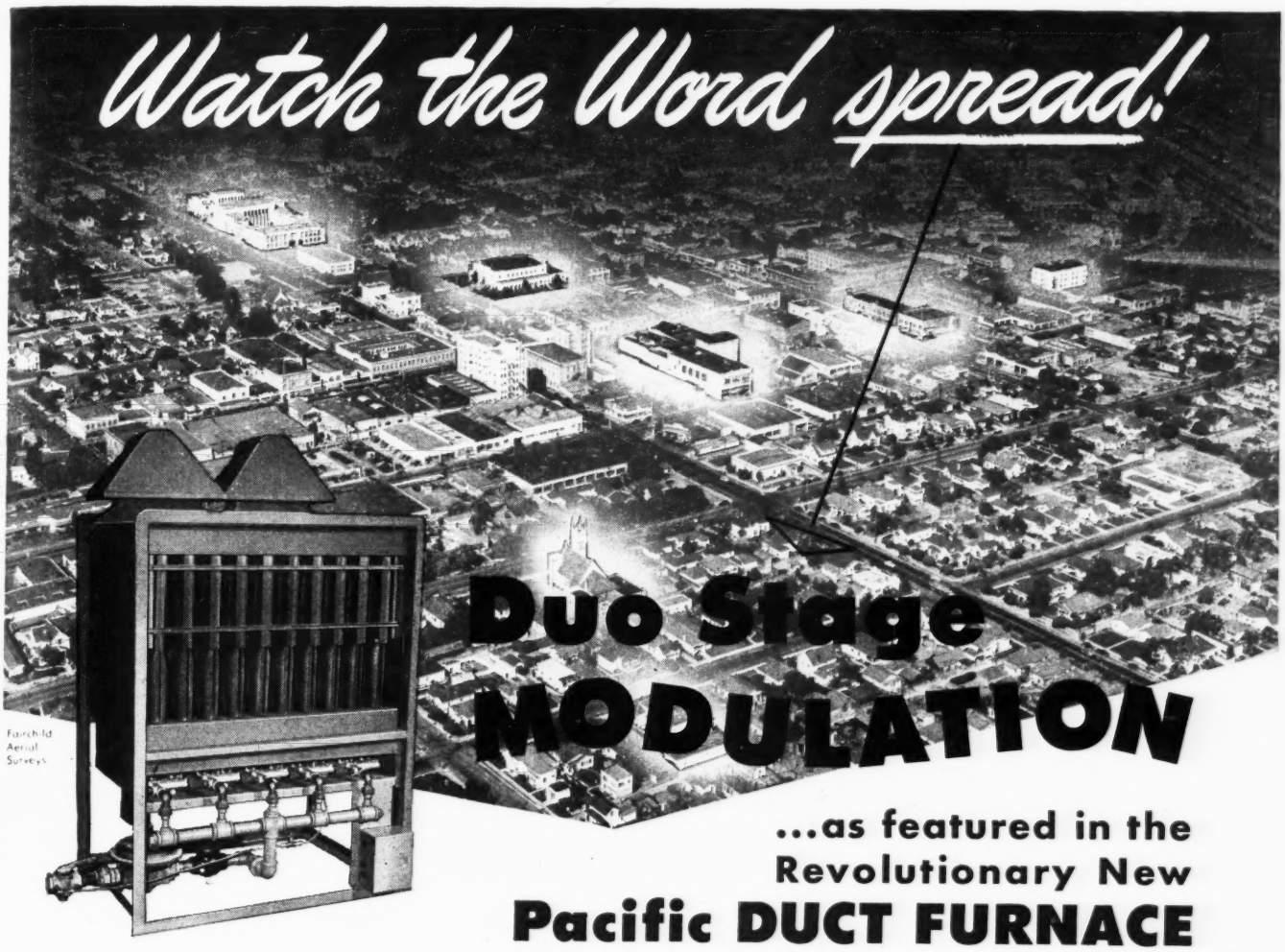
SURFACE COMBUSTION CORP. has prepared a number of dealer merchandising helps, including the above service decalcomania. This decal is planned for placing on each piece of equipment as it is installed and put into operation. It is a handy reference for the customer in case he wishes to call the dealer for adjustment or service. The decal is printed in full color. Other Janitrol promotional materials are match books, neon signs, and newspaper mats.

F. L. JACOBS CO's national sales manager of the appliance division, Clyde G. Remmo, forecast a minimum of five boom years for the automatic washer industry in a speech at a national sales convention held recently in Indianapolis. Remmo told Launderall distributors that the appliance industry is the sixth largest in the world, with automatic washers now representing 30% of all units sold and 50% of the industry in dollar volume. He said there are 17 million washing machines in use at present, half of them 10 to 15 years old.

BRYANT HEATER CO.'s Tyler, Texas, plant was in full production one year from the time ground was broken for the plant. New products rolling off the assembly lines include water heaters—one with anodic protection for hard water regions, circulating room heaters, panel wall heaters, and floor type furnaces. These products are equipped with burners for natural, manufactured and LP-Gas and are designed appearance-wise to fit into almost any spot in the modern home, plant or store.

RHEEM MANUFACTURING CO. has nounced price reductions of more than 30% on its line of gas fired floor furnaces, according to Frank J. Nugent, general manager, appliance sales. These reductions will be in effect for the months of June, July and August and will entitle the home owner to a substantial saving on floor furnaces shipped by the manufacturer after the announcement of this program.

Watch the Word spread!



Duo Stage MODULATION

...as featured in the Revolutionary New

Pacific DUCT FURNACE

The most exciting development in Automatic Gas Heating in years! That's the new Pacific Duct Furnace with the unique Duo Stage Modulation.

Ideal for so many types of larger buildings—schools, churches, theatres, residences, stores—the Duct Furnace is a highly efficient component of your heating, ventilating or air conditioning system, to which a still greater flexibility has been added.

By automatic selection of two stages of discharge air temperature, Duo Stage Modulation permits maintenance of constant room temperature without diminishing warm air circulation or fresh air ventilation.

This new conception of "heat blending" materially reduces stratification, temperature fluctuation and gas consumption. It also assures a wholly new standard of sustained comfort throughout the building being served.

Gas heating authorities everywhere make no bones about it. This new furnace is exciting news! It is the practical, immediate successor to conventional "hot blast" forced air furnaces.

Up and down every street in your town are customers who await the new Pacific Duct Furnace.

PATENT APPLIED FOR
©1947

MORE EXCITING NEWS TO COME
Pacific is the company to watch... other "Front Page News" will soon be announced to the Gas Heating Industry.
34 YEARS IN GAS HEATING EXCLUSIVELY!

NACO MANUFACTURING CO. PACIFIC HUNTINGTON PARK CALIFORNIA

NACO MANUFACTURING CO.

P. O. BOX 3103 · HUNTINGTON PARK, CALIFORNIA

PEOPLE

H. F. VOERTMAN has been elected by the Laclede Gas Co. board of directors to fill the newly created position of comptroller. E. L. RAMSEY was appointed assistant vice president, and will be in charge of personnel relations, succeeding Voertman. CHARLES L. DIGIOVANNI is the new customer relations manager.

JAMES E. MAVOR, Houston, and GENE McINTYRE, Los Angeles, have been appointed to handle pipe joint protection material for The Tapecoat Co., Evanston, Ill. According to the announcement, Mavor will handle distribution in the Mid-Continent area through his own representatives, F. P. KELLY, covering Louisiana and East Texas, and BOB LINGLE at Corpus Christi. McIntyre will cover California, Washington, Oregon, Nevada and Arizona.

OTIS CORLEY, who has been an executive with the Arkansas Western Gas Co. at Ozark, Ark., and elsewhere for several years, became manager of the company's Bentonville, Ark., office on July 15.

W. N. GRINSTEAD, treasurer, and E. C. OVERBECK, production department manager, were elected vice presidents of The Ohio Fuel Gas Co. at the annual meeting of stockholders and directors in Columbus. They succeed E. M. THARP, general manager, who resigned, and P. S. CLAPP, who has been transferred to New York. C. I. WEAVER was re-elected president and also was elected general manager. Grinstead, re-elected treasurer, now supervises distribution and sales and Overbeck, in his new position, supervises all of the mechanical operations except distribution. OHMER ULLREY, manager of general accounting, and J. S. PHILLIPS, manager of purchasing and stores, were elected assistant treasurers.

W. N. Grinstead

E. C. Overbeck

GEORGE A. SAAS has announced the opening of the G. A. Saas and Co. advertising agency in the Hume Mansur Bldg., Indianapolis. The new firm will specialize in advertising, sales promotion, and human relations work in the industrial and manufacturing fields. Since 1939 Saas has been advertising manager of the Citizens Gas and Coke Utility. He was a member of the AGA's Advertising Copy committee and the Customer Relations Committee.

RICHARD P. BROWN, chairman of the board of the Brown Instrument Co. and a director of Minneapolis-Honeywell Regulator Co., was awarded the honorary degree of doctor of engineering by DR. JAMES CREESE, president, Drexel Institute of Technology. Brown was the speaker for commencement exercises at Drexel. He holds 54 patents on industrial recording and control instruments.

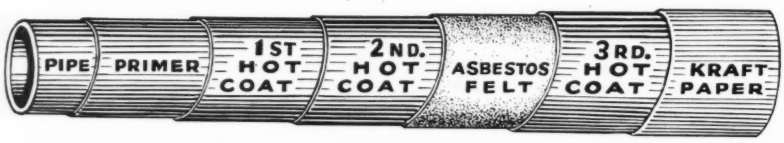
JOHN W. FRAZIER has been appointed general sales manager of Trion, Inc., McKees Rocks, Pa., formerly Pittsburgh Range Co. Frazier, who has been connected with Equitable Gas Co., Pittsburgh, since 1936, will direct sales and promotion activities for Trion's electrostatic precipitator for homes and commercial establishments.

WILBER F. PRAY is the New York district manager for Askania Regulator Co., according to a recent announcement. Pray has been associated with the company since in inception. The New York district office will be located in the building of General Precision Equipment Corp., Askania's parent company.

H. B. BRYANS has been elected president of the Philadelphia Electric Co. to succeed HORACE P. LIVERSIDGE, who becomes chairman of the board and continues as executive head of the company. N. E. FUNK, vice president in charge of engineering, was elected executive vice president and director.

Typical WITH HILL, HUBBELL PIPE PROTECTION INSTALLATIONS

Prominent engineers rate HILL, HUBBELL Coating-and-Wrapping as "TOPS" in the industry. They know . . . the *plus* extra years of uninterrupted service for pipe processed at our plants . . . the time economy of installing H and H processed pipe over field application...controlled factory processed pipe makes possible economical cathodic protection of lines.



HILL, HUBBELL PIPE PROTECTION *to your specification*

Hill, Hubbell and Company
Division of GENERAL PAINT CORPORATION
3091 MAYFIELD RD. CLEVELAND, OHIO.

NOTE TO EXECUTIVES:
This is the first in a series of advertisements which describe the operation and service of Rheem simplified engineering features for gas-fired appliances. The data is taken from the comprehensive instruction and service manual which is attached to every product. If you would like to make this booklet available to your service personnel, at no cost, simply mail the coupon below.

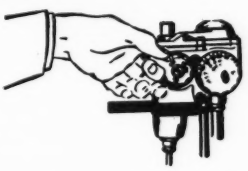
The RHEEM 100% DUAL CONTROL

This compact, patented control is standard equipment on Rheem automatic gas water heaters with the exception of the Series 20 economy model. It guarantees safety because it automatically shuts off all gas if the pilot light is extinguished . . . it also makes it impossible for gas to flow to the burner while the pilot is being lighted.

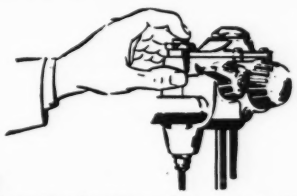
The Rheem 100% Dual Control consists of four separate units contained in one casting:

"C" valve
A pilot adjusting plug.
A rod and tube snap-acting thermostat.
A Baso type thermo-magnetic safety pilot.
A taper plug type main gas cock with flow adjustment.

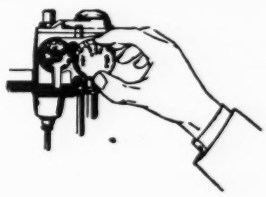
TO OPERATE



1
Set lever accurately at "pilot". Depress pilot reset button down to the cap nut.



2
Keeping button depressed, light pilot. *Continuing holding button for 2 minutes.* Release the pilot button.



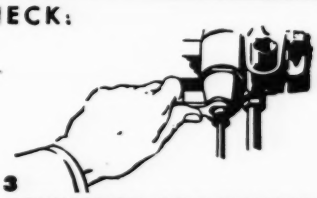
3
Now turn the lever to "on". Turn dial to desired temperature.

TO SERVICE

IF THE PILOT LIGHT GOES OUT, CHECK:

1
SIZE OF FLAME. If the pilot light does not envelop the thermocouple, it must be adjusted. Remove the screw cap and turn the small screw underneath.

2
POSITION OF LEVER. Was "pilot" set in dead center of indicator button? If not, pilot reset button could not have been fully depressed.



3
CONNECTION OF THERMOCOUPLE LEAD TO MAGNETIC VALVE. Is this double-thread connection tight? If not, tighten it firmly.

Complete data for operation and service of the Rheem 100% DUAL CONTROL is contained in an attractive, clearly illustrated manual. If your service men are acquainted with this information, it may save them time and labor in the field. Just indicate the number of copies you need and mail this coupon.

Rheem, Dept. R-B11
570 Lexington Avenue, New York 22, N. Y.

Please send me ( )copies of your Instruction Manual on the Rheem 100% DUAL CONTROL, at no cost.

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

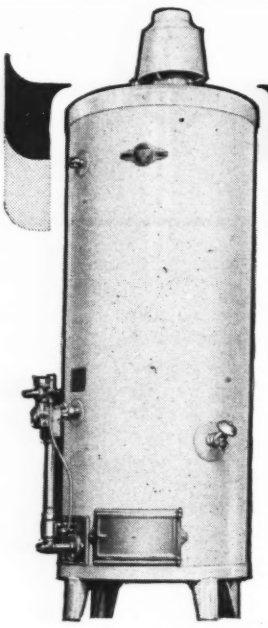
Rheem
Automatic Gas-Fired Appliances

COL. A. E. HIGGINS has been named vice president of the Rockwell International Corp., New York City. Col. Higgins retired from the army after a distinguished career. Prior to the war he had been associated with the Rockwell organization from 1937 to 1942. In his new position he will be responsible for the export marketing of products of the various Rockwell divisions and will be assigned special duties in domestic marketing activities.

JUDGE ROBERT W. OTTO, by recent action of the board of directors of The Laclede Gas Light Co., was appointed president of the company, succeeding L. W. CHILDRESS. Childress will continue to serve as chairman of the board. Judge Otto joined Laclede in 1934 as general counsel. Shortly thereafter, he was made vice president and became a member of the board of directors.

The Laclede organization has also announced the following promotions: TOM YOUNGLOVE of the street department was promoted to foreman in the natural gas department on March 1. WILLIAM F. MARSHALL of the stores department became shop foreman on April 7. The new yard foreman at the Coke Station is CHARLES SIELNACHT. He received his promotion on May 5.

FRED W. SMELTS, manager of the coke department of the B. C. Electric Railway Co., Vancouver, has been elected president of the Canadian Folk Society, Vancouver branch.

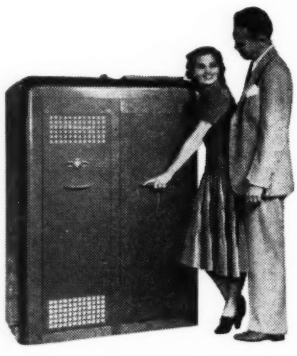


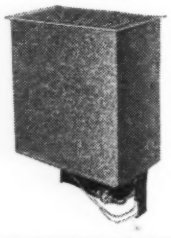
Outstanding
Quality...Styling...Value

Greater grows the demand for SECURITY Automatic Hot Water Heaters. More and more buyers seek the smart appearance, dependable performance, superior workmanship for which SECURITY is famed. Thousands of users are amazed at the efficiency, economy and long life of these gleaming Automatic Water Heaters. Operate on all fuel gasses. Now is the time to look to SECURITY . . . for leadership and for sales.

SECURITY
GAS FIRED SGP PRODUCTS
The "LONG-LIFE" LINE

OTHER POPULAR SECURITY AUTOMATIC GAS PRODUCTS are the Forced Air Winter Air Conditioners (below), Gravity Furnaces and Quick Hot Water Heaters. Designed for natural, artificial and L-P gasses. Write for complete information.





SECURITY MANUFACTURING CO.
1630 Oakland Avenue
Kansas City 3, Mo.

EDWARD K. TITUS has been appointed Eastern editor of GAS. Titus is an editorial man of wide experience, having covered important industrial and financial features for the New York "World Telegram" and the Brooklyn "Daily Eagle," one assignment taking him around the world. He served in the air corps during the last war.

A graduate of Phillips-Exeter and Yale, Mr. Titus is a member of the New York Financial Writers Association and the National Press Club, Washington, D. C.

As Eastern editor, Titus will write current news and feature articles covering the gas industry. His headquarters will be in the New York office of Jenkins Publications, Inc., 52 Vanderbilt Ave., which is also the address of Gerard A. Regan, the company's Eastern manager.

LYNN A. WILLAMS, JR., has resigned from his recently-acquired position as vice president in charge of the South Wind Division of Stewart-Warner Corp. Williams is now president of the Great Books Foundation. F. A. HITER, senior vice president of Stewart-Warner, has assumed direct charge of the South Wind Division. D. C. PETERSON, director of engineering and research, replaces Williams as chairman of the engineering committee.

A. EMORY WISHON heads the list of Pacific Gas and Electric Co. executives who received new appointments last month. Wishon became executive vice president in which capacity he will assist President JAMES B. BLACK and will

A. E. Wishon

J. S. Moulton

direct the department of general construction. Other appointees are: WILLIAM G. B. EULER, vice president and general manager; I. C. STEELE, vice president and chief engineer; JAMES S. MOULTON, vice president and executive engineer; NORMAN R. SUTHERLAND, vice president in charge of public relations and sales; and D. P. SMALLEY, vice president in charge of operation.

L. L. BAXTER, president, Arkansas Western Gas Co., has been named president of the Fayetteville (Ark.) Industrial Foundation. The group was organized by business leaders of the vicinity to raise funds for erecting factory buildings for proposed industries seeking locations in Fayetteville.

FREDERICK W. FISHER, head of the personnel and public relations department of the Rochester (N. Y.) Gas & Electric Corp., has retired after 38 years of continuous service with the company. He was guest of honor at a reception given by his associates.

FORBES W. BURDETTE has been appointed manager of The Manufacturers Light and Heat Co. distribution district No. 5, succeeding GEORGE A. WALTHER, manager of the district for the past 11 years, who has been assigned special duties in the company's distribution department. THOMAS J. FOLEY, former local manager at Beaver Falls, New Brighton and Rochester, Pa., replaces Burdette as local manager at New Castle, and OREN O. TODD will fill Foley's position.

RICHARD W. MOORE, 28-year-old manager of the Sayre, Okla., office of the Consolidated Gas Utilities Corp., has been designated as Oklahoma's outstanding young man for 1946 by vote of the Oklahoma Junior Chamber of Commerce convention. Moore took the lead in organizing the Sayre Junior Chamber of Commerce and was very active in civic, Boy Scout and church activities.

W. E. Davis

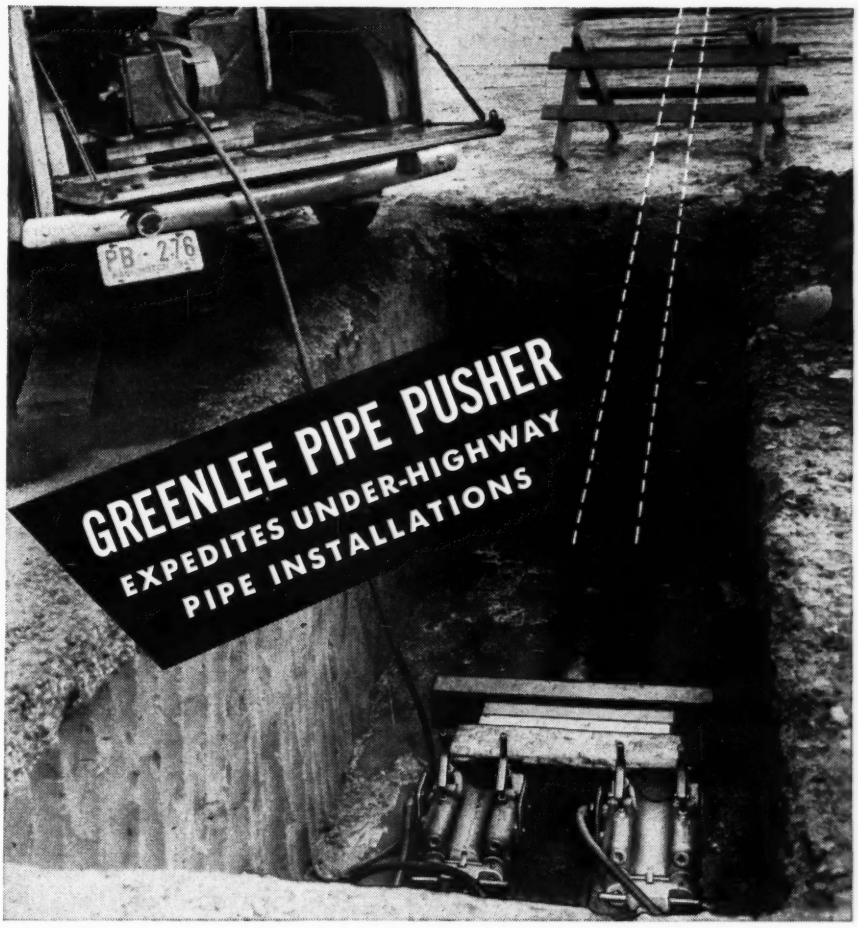
WILLIAM E. DAVIS has been appointed supervisor of trade and dealer relations, Equitable Gas Co. He will be responsible for supervision of architect, builder, and dealer activities of the company. Davis joined Equitable in 1935 and has served as heating layout designer, trade development representative, in engineering capacities, and as supervisor of architects' and builders' services. He is a member of the Pittsburgh Architectural Club, Producers' Council, Pittsburgh Builders' Exchange, and Home Builders' Association of Allegheny county.

G. W. BEECROFT and Co., Toronto, has been appointed sales representative for the province of Ontario by Fisher Governor Co. Beecroft retired from the Canadian army last year. He is a graduate of the University of Toronto and has had extensive experience with the International Petroleum Co., Ltd., in South America and in the petroleum industry in Canada.

JOHN A. CLEVELAND, Grand Rapids, WILLIAM M. LEWIS, Muskegon, and WARD G. COBB, Owosso, retired on June 30 from their positions as division managers of Consumers Power Co., Jackson, Mich. They are succeeded by JAMES H. CAMPBELL, LIONEL L. BOOTH and SIDNEY C. DOWLING, who took over in the respective districts on July 1.

HENRY ST. LEGER has been appointed the first general secretary of the International Standardization Organization. The announcement was made by HOWARD COONLEY, ISO president and chairman of the executive committee of the American Standards Association. St. Leger leaves his post in the office of the U. S. Chief Counsel for the Axis trials at Nurnberg.

BRIG. GEN. HUGH C. MINTON, who was named production manager of Koppers Co., Inc., on May 10, has been appointed a vice president of the company. His headquarters are in the Koppers Bldg. in Pittsburgh.



In Washington the state law says you can not tunnel under a highway. But that didn't stop Marckmann & Williams of Seattle from installing 42 feet of 10-inch pipe under the state highway near Sumner, Washington.

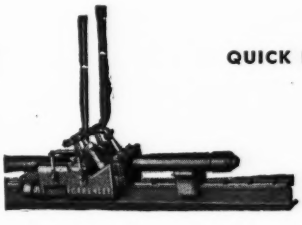
They used two GREENLEE Hydraulic Pipe Pushers and a Power Pump . . . they *pushed* the pipe under the road.

You, too, can simplify and speed underground installations of pipe with a GREENLEE Pusher—manually or power-operated according to your jobs.

Push pipe under streets, sidewalks, floors, lawns, railroads, and other obstructions. Eliminate extensive ditching and tearing up . . . save time and heavy costs of tedious back-filling, tamping, re-paving (just a short trench accommodates the pusher).

Save with a GREENLEE, which often pays for itself on the first few jobs. Get facts now by writing Greenlee Tool Co., Division of Greenlee Bros. & Co., 1948 Columbia Avenue, Rockford, Illinois.

TOOLS FOR CRAFTSMEN
GREENLEE



QUICK FACTS ABOUT THE GREENLEE HYDRAULIC PIPE PUSHER

Easy — one or two men can easily operate on any job. *Portable* — compact, easy to carry to job and set up. *Fast* — operates at six different speeds. *Two models* — (1) for pipe up to 4-inch; (2) for larger pipe, drainage ducts, concrete sewer pipe. Do the job easier, quicker with a GREENLEE.

TAPECOAT Those "Weak Links"

In Your Fight Against Corrosion...

It doesn't make sense to protect pipe with quality coatings and then use makeshift protection on pipe joints. After all, protection is only as good as its weakest joint.

That's why more and more distribution engineers are standardizing on TAPECOAT—the dependable wrapping in tape form that provides pipe joint protection equivalent to the mill coating on the pipe.

TAPECOAT is easy to apply. You simply spiral wrap the joint, starting and ending on the mill coated pipe, thus making the protection on the joint equal to the coating on the pipe. It will pay you to guard against those "weak links" with TAPECOAT.

Write for complete details.

The TAPECOAT Company

1523 LYONS STREET EVANSTON, ILLINOIS

H. H. Ganser

H. H. GANSER, regional vice president of the Philadelphia Electric Co. at Norristown, Pa., has announced his retirement. Ganser, who served with the utility 48 years, started as a bill clerk in what was then the Gas Co. of Montgomery County and later the Norristown Electric Light and Power Co. He has resided in Norristown for over 50 years and has been active in many civic and business organizations.

FRANCIS B. FOLEY, superintendent of research for the Midvale Co. in Philadephia's suburban Nicetown, has been nominated for the office of 1947-48 president of the American Society for Metals by a committee of the society's 21,000 members. Foley holds the office of ASM national vice president. Others nominated are: DR. H. K. WORK, Jones and Laughlin Steel Corp., Pittsburgh, vice president; F. L. SPANAGEL, Rochester (N. Y.) Gas & Electric Corp., treasurer; DR. E. G. MAHIN, Notre Dame University, and C. M. CARMICHAEL, Shawinigan Chemicals, Ltd., Montreal, national trustees.

RICHARD L. BRUMMAGE is the new president of the Cleveland Control of the Controllers Institute of America, succeeding PHILLIP W. SCOTT. Brummage is controller of Dresser Industries, Inc. Other new officers of the Cleveland Control, which takes in all of northern Ohio, include RALPH H. SMITH of the Cleveland Electric Illuminating Co., vice president; GEORGE C. HOUCK of Harris-Seybold Co., secretary; and HALLIE J. ENSIGN of Willard Storage Battery Co., treasurer.

D. S. SHARP has been promoted to sales manager of Tappan Stove Co. He was Tappan's southern Ohio sales representative from 1936 to 1942 when he joined the Jeffersonville, Ind. quartermaster corps as procurement specialist and directed the organization of the contract termination branch. Sharp rejoined Tappan in 1944 as director of retail sales training. In September, 1945, he was promoted to assistant sales manager.

STEWART ROBERTS has been appointed director of advertising and sales promotion for Bendix Home Appliances, Inc. Roberts has been associated with the "Chicago Herald & Examiner," Hays MacFarland Advertising Agency, "American Magazine" and, most recently, United Wallpaper Co. where he served as vice president in charge of the Trimz division, with headquarters in Chicago.

OLIVER F. GANG has been elected president, director and general manager of the Ludlow Valve Manufacturing Co., Inc., succeeding ALFRED W. THOMPSON, who becomes chairman of the executive committee and continues as treasurer of the company. Announcement of the changes was made by LIVINGSTONE W. HOUSTON, chairman of the board, following a meeting of the directors on July 1.

HENRY E. DEAN recently was appointed general purchasing agent of The Gas Service Co., Kansas City. Since 1937 he has served as assistant general purchasing agent. R. M. POWER, recently elected a first vice president and director of the company, is now office manager in the general office.

- OBITUARIES -

DONALD A. SILLERS, 52, who was responsible for many technical developments in the natural gas industry and was a recognized authority on gas measurement, died June 23 at his home in Dallas. Sillers was superintendent of gas measurement for Lone Star Gas Co. from 1925 to 1945, when he left to organize the Peerless Manufacturing Co., of which he was president. He developed the gas slide rule, specific gravitometer and gravity balances and many advances in the design of manufactured gas cleaners, gas and oil separators, automatic traps and regulators.

B. P. Carey

BERNARD P. CAREY, 53, former vice president-general counsel of the Philadelphia Electric Co., died in Philadelphia on July 7. Carey entered the employ of the company in 1913 and was transferred to the legal department a few years later. In 1924 he was named attorney for the company, and counsel in 1928. He continued in that capacity until 1939 when he was appointed general counsel. In 1943 he was elected vice president of the firm.

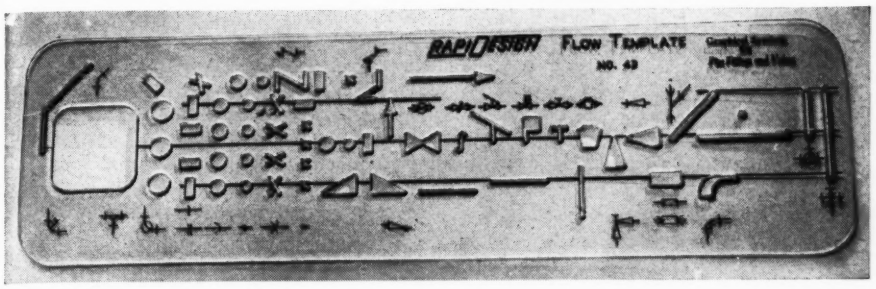
HAROLD K. SEELEY, general superintendent of gas operations for the Central New York Power Corp., Syracuse, N. Y., died suddenly at Port Alleghany, Pa., recently. Seeley began his career with the United Gas Improvement Co. at Philadelphia in 1910, becoming superintendent of gas production for the Allentown Gas Co. in 1916. He joined the Syracuse Lighting Co. in 1926, and when that firm merged with others to form Central New York Power, he was placed in charge of gas production and distribution for the entire territory.

ROSCO NETTLES, 60, former president and general manager of the Tampa Gas Co., with which he was associated for more than 40 years, died late in June after an illness of four weeks. Joining Tampa Gas as a clerk in 1901, he became general manager in nine years at the age of 24, and was elected president in 1936. He served in this capacity until his retirement in 1942.

W. J. MacPHERSON, vice president, Public Service Co. of Northern Illinois, died of a heart attack on June 23. He began his 36-year utility career in 1911 when he started working for Northwestern Gas Light and Coke Co., which later consolidated with Public Service Co.

SAMUEL W. BROWN, 66, former head of the Pensacola Gas Co., died early last month at Pensacola, Fla. For the last several years he had lived in Decatur, Ala., where he was manager of the gas plant.

NEW PRODUCTS



Flow Template

RAPIDESIGN, INC., P. O. Box 592, Glendale, Calif.

MODEL: No. 42 Flow Template.

APPLICATION: For gas, oil, water and chemical pipe and plumbing layouts.

DESCRIPTION: Cutouts cover all the symbols as shown in the American Standards Manual Z32.2. The Flow Template is made of .040 mathematical-quality plastic. Printing is laminated between sheets to prevent its wearing off. All symbol cutouts are beveled. Template size is 2¾ in. x 6¾ in. with rounded corners. List price is $3.50.

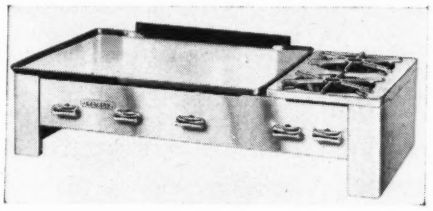
Counter Griddle

DETROIT-MICHIGAN STOVE CO., 6900 E. Jefferson Ave., Detroit 31, Mich.

MODEL: Garland Counter Griddle No. 224-2.

APPLICATION: For commercial cooking.

DESCRIPTION: Four models are offered with a choice of black japan finish or stainless steel. Two models are being made with two standard open top



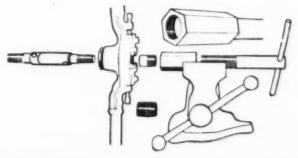
Garland burners and two with griddle only. Griddle sizes in both types are available in 18¾ x 24 in. and 18¾ x 30 in. Streamline styling improves efficiency and convenience. All models are in production.

Threading Tools

WING S. LABORATORY, Grass Lake, Mich.

MODEL: Nipple-Guide and Pipe-Chuck Angle Threading Tools.

APPLICATION: For a quick, simple and



accurate means of threading any length pipe.

DESCRIPTION: A flat thread of the nipple-guide fits the high parts of the internal pipe surface, while up the taper a sharp thread fits the low parts and assures accurate alignment for guiding the threader. The ringed-end may be adapted to standard or thin wall pipe; the blank end to thick or standard wall pipe.

When it is necessary to connect runs of pipe that are out of line, an angle from 0° up to 15° is easily made per pair of threads. The illustration is an exploded view of a regular pipe threader with its dies turned over. First set of threads is made on a long pipe; length desired is cut off and screwed up to the stop. The nipple-guide is pushed through the threader and screwed into the half-completed nipple. After threads are made and the stop is released, the nipple is turned out with the fingers. The pipe-chuck is tapped oversized for pipe to screw freely. Total operation from long pipe to completed short pipe requires from two to four minutes.

These tools are hardened, electroplated, and are used with removable or reversible-die stocks. They come in sizes ⅛ in. to 1 in.

TO THE MANAGEMENT OF SMALL CITY GAS DISTRIBUTION SYSTEMS

Many small gas utilities are consulting Warren on conversion of their gas systems to Liquefied Petroleum Gas. They are learning that, with comparatively low expense for plant conversion, labor, fuel and maintenance costs are substantially lower after the adoption of Liquefied Petroleum Gas.

This cost saving means greater service to your customers and more profitable utility operation.

Warren's greatly expanded production and delivery facilities are adequate to meet your requirements.

Contact your nearest Warren office today.

"1922-Silver Anniversary Year-1947"

WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA
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"Elno"

TRADE MARK REG.

RUST PREVENTER

For Automatic Water Heaters, Range Boilers, And All Types Of Hot Water Storage Tanks

"Elno" prevents rusty water in domestic and industrial water heating systems. It is a pure and simple rust preventer. It extends the life of galvanized storage tanks, especially where corrosive water conditions exist.

"Elno" is made to fit all makes of Automatic Water Heaters, Range Boilers, and Large Volume Hot Water Storage Tanks.

"Elno" is easy to install. Remove the hot water fitting and replace it with the "Elno" rod—that's all. "Elno" is equipped with a hot water fitting.

"Elno" enables you to sell Clean, Rust-free Hot Water Service. "Elno" gives you another talking point, an added selling feature.

There is an "Elno" made to fit the water heater you sell.

Write for prices.

If you want to read the Story of Corrosion, its Causes and Prevention, write for Facts Bulletin No. 102.

The Cleveland Heater Co.
"Elno" Division
2310 Superior Avenue
Cleveland 14, Ohio

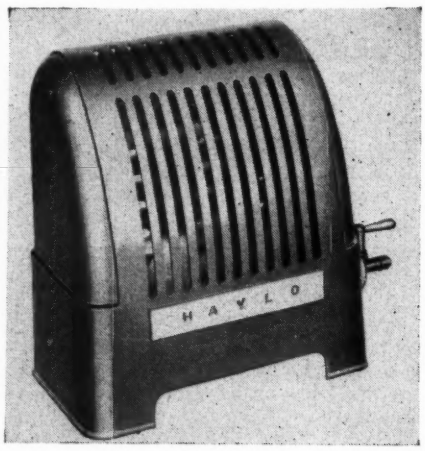
Rustproof Heater

HEATER DIVISION, McCULLOCH MOTORS CORP., 6101 W. Century Blvd., Los Angeles 45, Calif.

MODEL: Haylo Gas Heater, M-70.

APPLICATION: Useful the year round in bathrooms, small apartments, nurseries, recreation rooms, kitchens, bedrooms, etc.

DESCRIPTION: Built entirely of high-



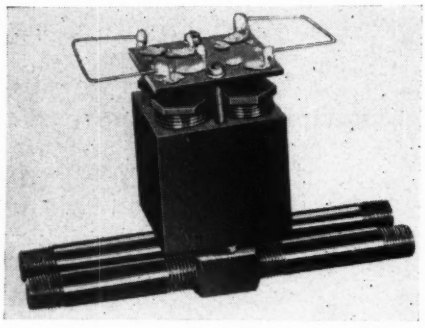
pressure aluminum alloy die castings, this heater is rustproof, dentproof, rigid and durable. Exterior finish is a soft brown glaze, and the interior is the natural bright color of the aluminum alloy, which increases radiant-heating effectiveness. Efficient heating by convection is obtained through the louvered frame. Capacity of the AGA-approved, unvented heater is 6000 Btu with natural, manufactured or LP-Gas. Dimensions are 11½ in. high, 6 in. wide and 12 in. long. Weight is 4¼ lbs., complete with valve.

Gas Testing Unit

GOW-MAC INSTRUMENT CO., 22 Lawrence St., Newark 5, N. J.

MODEL: Gow Mac Thermal Conductivity Unit.

APPLICATION: Provides an accurate but inexpensive means of observing



gases by the thermal conductivity method. It is flexible in gas train sampling, and standard instruments and accessories, as found in any laboratory, can be used with excellent results. Typical applications include special atmospheres, gas synthesis, inert gas generation and distribution, efficiency of internal combustion engines and furnaces, and wherever hydrogen and carbon dioxide are found. Units may be used with indicating, recording or controlling instruments.

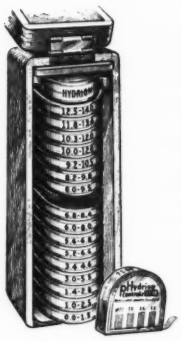
DESCRIPTION: The unit incorporates four filaments assembled in appropriate chambers and wired in a balanced bridge arrangement. Each of the four elements conforms to predetermined standards of resistance. When used with a suitable source of constant voltage, the degree of unbalance of the bridge circuit provides an accurate measure of the relative thermal conductivity of an unknown gas or the quantitative variation in a known gas.

Relatively unaffected by vibration or ambient and current change, the unit is compact (1½ x 3½ x 2⅜ in.) and specially constructed for high sensitivity, long life and stability. All parts are precision machined and there is no glass or cement to crack or flow and thus change characteristics. Each cell is tested at 10 psi prior to shipment. Details will be furnished on request to the manufacturer.

Testing Kit

R. P. CARGILLE, 118 Liberty St., New York 6, N. Y.

MODEL: H-20 Hydrion Set.



APPLICATION: To locate the approximate pH value of a solution.

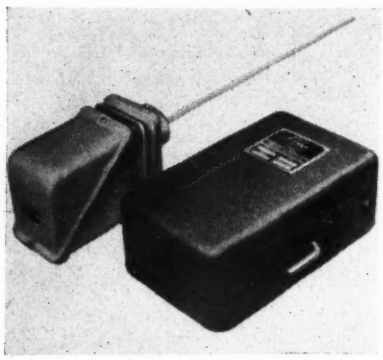
DESCRIPTION: This kit contains 19 Hydrion pH test papers in 18 plastic dispensers, all in one convenient easel-type, hardwood case. This assortment covers the full range from 0.0 to 14.0 pH, and distinct color changes can be obtained within 0.25 pH unit of almost any point of interest on the pH scale. Eleven of the papers are being released for the first time. The complete set is priced at $20.

Flame Failure Safeguard

COMBUSTION CONTROL CORP., 77 Broadway, Cambridge 42, Mass.

MODEL: Fireye Electronic Flame Rod Type 45JQ1.

APPLICATION: For industrial gas oven, kiln, and boiler protection; readily



applicable to all types of gas-fired burners.

DESCRIPTION: Fireye is claimed to be a foolproof electronic flame failure safeguard which actually "feels" the gas

flame—maintains a constant vigil day and night against the ever-present danger of flame failure. When flame fails, it instantly cuts off fuel and can be wired to sound an alarm automatically. Unlike thermal controls, Fireye responds to the flame itself, rather than to a secondary effect of the flame. Unique design features are incorporated, resulting in ease of installation, adaptability to all gas burner heads, immunity to moisture and electrical leakage, and protection from combustion by-products.

Automatic Shop Furnace

ECLIPSE FUEL ENGINEERING CO., 730 South Main St., Rockford, Ill.

MODEL: Eclipse Automatic Shop Furnace.

APPLICATION: Designed to meet the needs of shops requiring a small toolroom furnace for hardening punches, dies and small tools. While designed for carbon and intermediate steels, high speed steel can be handled satisfactorily.

Although intended for intermittent use, the furnace can be operated continuously under favorable conditions.

DESCRIPTION: The fully enclosed unit is made of fabricated steel, rather than castings, and a streamlined body houses all working parts, protecting them against dust and damage and eliminating any possibility of workmen accidentally contacting any of the electrical or mechanical machinery. The McKee Eclipse centrifugal blower is driven by a direct-connected motor—no transmission required. A McKee proportional mixer automatically regulates the proportion of gas and air. Control dial is located conveniently at the front of the furnace.

The furnace is shipped completely assembled and requires little floor space. After setting up it is only necessary to connect gas and electrical lines to make the furnace ready for use.

Flexible Connection

CHICAGO METAL HOSE CORP., Maywood, Ill.

MODEL: Rex-Weld Flexible Connection RW-67-T.

APPLICATION: For ranges, heaters, refrigerators and other gas-burning household units.

DESCRIPTION: Installation of this

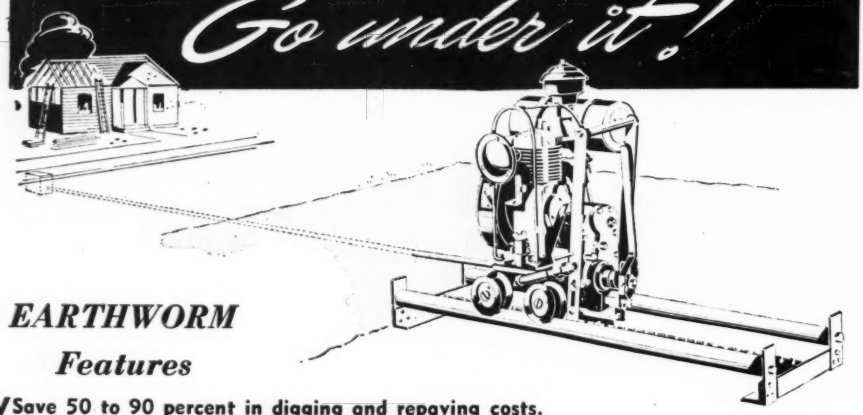
ARCCO
BETA CHART PENS
...HOLD 2 to 4 TIMES MORE INK
Beta Fountain Pens hold two to four times the ink of ordinary chart inking pens. Regardless of the line thickness Beta Pens produce a smooth unbroken and uniform line. Pens shown are approximately actual size and can be arranged to reduce time interval between static and differential lines to only a few minutes. Beta Pens are especially suitable for seven day records. Price $1.00 (lower prices in quantities).
Send for bulletin No. 110.
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. • Los Angeles 23, Calif.
Available for Early Delivery
SEND FOR BULLETIN NO. 110

MUNICIPAL GAS SYSTEM ENGINEER

SOUTH AMERICAN MUNICIPALITY, population 130,000, requires engineer take charge natural gas distribution system handling approximately 1,250,000 cu. ft. daily. Must have administrative ability. Age 35-45. Employment contract for indefinite period. Salary good. Knowledge Spanish desirable but not essential. State all qualifications first letter.

Box 175, GAS, 1709 W. 8th St., Los Angeles 14, Calif.

DON'T DIG UP THE STREET
Go under it!



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Features

✓Save 50 to 90 percent in digging and repaving costs.
✓Minimum manpower requirements—easily portable.
✓Easily operated—straight line accuracy in boring to given point.
✓Minimum street openings. Manual feed warns of underground lines.
✓Quickly pays for itself—average boring speed, 1½ ft. per min.
✓Complete unit—requires no auxiliary equipment.

3 Models — Write for delivery and operating instructions.

Over 60 percent of our post-war production has been purchased by pre-war users.

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Earthworm

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LUBE JACK CO., SANTA MONICA, CALIF.

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NAME_____ POSITION_____

COMPANY_____

STREET CITY ZONE STATE

AGA-approved bronze connection allows range to be moved close to wall and permits easier cleaning, painting or repair. Motion does not place undue stress on fittings. RW-67-T permits plane bends not possible with copper or aluminum tubing alone. When bent, the flexible member does not work-harden nor will it collapse.

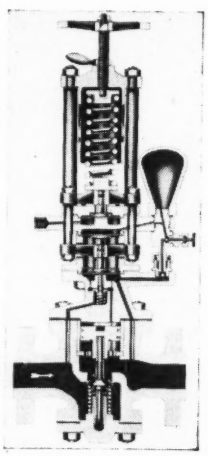
This connection has an I.D. of ½ in. and is available in the following standard lengths: 2, 2½, 3, 3½, 4 and 5 ft.

Improved Pump Governor

LESLIE CO., 92 Delafield Ave., Lyndhurst, N. J.

MODEL: Pump Governor.

APPLICATION: Specially designed for high accuracy of control, to resist the wear and erosion, and to improve pump performance and reduce governor maintenance through elimination of stuffing box and rubber diaphragms.



DESCRIPTION: Hard surfaced seat rings, 800 Brinell hardened stainless steel main valve and 500 Brinell cylinder liner reduce wear where it is usually felt the most. The hard seating surface is applied as a welded section to seat rings of bronze governors and to the main body of steel governors. Combined with the 800 Brinell main valve, it provides a long life combination that has never before been offered as standard equipment, the manufacturer states.

Other design features include instrument accuracy of regulation, wide spring range which permits settings without change of spring or diaphragm, single seated valve, no packing or stuffing boxes, complete interchangeability of replacement parts without removal of the body from the line.

Available in sizes from ½ in. to 4 in. for inlet pressures from 40 to 600 psi at temperatures to 750°F.

Pneumatic Controller

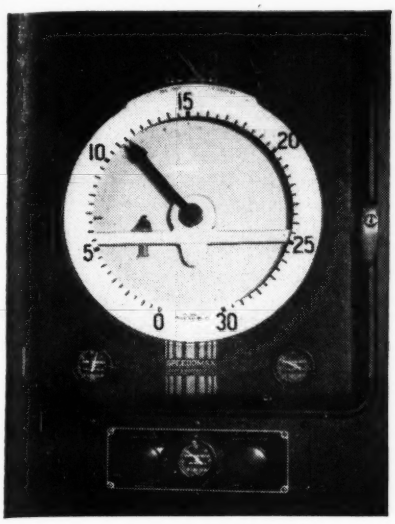
LEEDS & NORTHRUP CO., 4934 Stenton Ave., Philadelphia 44, Pa.

MODEL: R Speedomax Pneumatic Controller.

APPLICATION: For practically any control job in chemical plants and refineries.

DESCRIPTION: The device features rugged, machine-like construction and heavy-duty parts, is faster-acting, more flexible and more compact than previous L&N models. Its ability to handle process upsets, returning temperature or other condition to the control point in remarkably short time, has been demonstrated, according to the company. The controller can be supplied to control temperature (using radiation-type detectors, thermocouples, or resistance thermometers), pH, gas analysis, and electrolytic conductivity.

A round-chart controller is available



where an extra-visible scale is required, or a strip-chart model where a detailed record on a wide chart is needed. Further information may be obtained from the company.

HOME SERVICE

PORTLAND (ORE.) GAS & COKE CO.'s home service director, Rita Calhoun, who is also chairman of the home service committee of the Pacific Coast Gas Association, authored an article urging the use of skits for efficient promotion of home appliances, which was printed in a recent issue of "Retailing Home Furnishings." The article, which stressed the speed and clarity with which information may be relayed to the customer through a dramatic presentation, also constituted good national publicity for the gas industry.

TAMPA (FLA.) GAS CO. selected Miss Mary Dorn, home service director, to supervise the Junior Cook School, of six weeks duration, which the firm sponsored recently. Some 75 enthusiastic girls, between the ages of 11 and 14, attended the course. Classes dealt with bread, vegetables, meats, preparation of whole meals, table setting and entertaining. Mothers were entertained at the graduation ceremony. Typed instructions on each lesson were added to the Blue Flame Junior Cook Book, which had been distributed to the class.

Assistants were Marea Bordt and Elizabeth Barclay. Miss Dorn announced plans for fall classes for brides, business girls, homemakers and older teenage girls.

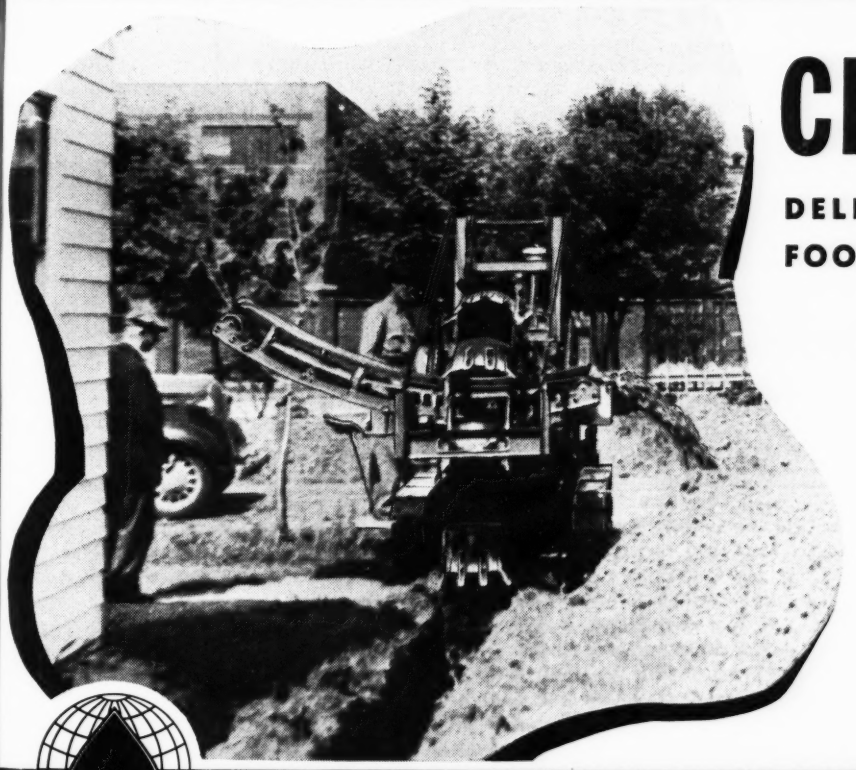
SOUTHERN CALIFORNIA GAS CO.'s home service department supported the government's food conservation program during the war by emphasizing facts about nutrition, food values, etc., to Los Angeles school children through stage presentations which provided both education and entertainment. The idea is being revived with a new playlet called "Platter Patter," which is being presented to high school audiences. There is but one scene—the modern all-gas kitchen of a home. Advantages of the gas appliances are cleverly worked into the conversation.

BENDIX HOME APPLIANCES, INC., recently conducted a three-day school at its home laundry institute to acquaint attendants with automatic home laundering techniques, laundry planning, fundamentals of laundering and the load-building potentialities of automatic equipment. Miss Margaret B. Doughty, institute director, guided the group which included home service personnel of 12 utilities.

Speakers included Judson S. Sayre, Bendix president; M. R. Rodger, utility sales manager; Walter J. Daily, director of advertising; Mary Belle Burnett, Cincinnati Gas & Electric Co.; Kenneth C. Randolph, chief chemist; A. P. Smith, national service manager, and Grant Layng, manager of the builders division.

SAN DIEGO GAS & ELECTRIC CO. is sponsoring a six-week course called "Fun in the Kitchen" for Girl Scouts and Campfire Girls, under the supervision of Ruth Strong, home economist. The domestic science building at San Diego high school is the site selected for the course, and a battery of six new gas ranges recently installed in the kitchens will play a major part in selling the idea of gas to the teen-agers who attend the course. Cooking a whole meal at a time is one of the basic principles to be stressed. Miss Strong announced that she will conduct a course of "Cooking Hints for Range Salesmen" in the fall.

MOBILE • COMPACT • RUGGED *and* FAST



CLEVELANDS

DELIVER MAXIMUM TRENCH FOOTAGE AT MINIMUM COST

for TRENCHING

OIL
GAS
GASOLINE } LINES
SEWER
WATER

DRAINAGE (FARM OR FIELD)

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THE CLEVELAND TRENCHER CO.
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

DESIGNED ESPECIALLY FOR ONE MAN OPERATION

Operates on 90 lb. air pressure and a small stream of water

How to install **PIPE** with your air-compressor . . .

Why not utilize your air-compressor to do underground pipe installation? Much less costly than trenching; especially so because Hydrauger goes *under* pavement instead of *through* it! Anyone can operate the HYDRAUGER.

NEW
MODEL L-2

Bores 2" Dia. Reams 3½" and 4½" Dia. . . . makes 100' of clean, bored hole

HYDRAUGER*
*Reg. U. S. Pat. Off.
EARTH BORING TOOL

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HYDRAUGER CORPORATION, LTD.
116 New Montgomery St., San Francisco, Calif.

HECO'S *New* PRECISION DIE-CAST Gas Appliance REGULATOR

Designed, engineered and produced complete by Heco, units are individually tested to assure close control at minimum maintenance cost.

Available for Immediate Delivery

- PRESSURE DIE-CAST FROM FINEST ALUMINUM ALLOY
- BRASS-TO-BRASS SEAT
- CORROSION-RESISTANT INTERNAL PARTS
- LOWER SHIPPING COSTS
- CLOSE CONTROL
- HIGH CAPACITY
- LOW MAINTENANCE
- INDIVIDUALLY TESTED
- APPROVED BY A. G. A.

INSIST ON THE *New* HECO REGULATOR FOR PRECISION PERFORMANCE

New, too, is the line of HECO Precision Machined Brass Valves and Cocks. Write for prices, Catalog No. 47 G on the complete line, giving jobber's name.

TESTED AND PROVED PRODUCTS · HECO ·

HECKETHORN MANUFACTURING & SUPPLY CO.
LITTLETON, COLORADO, U.S.A.

THE AMERICAN GAS ASSOCIATION display at the American Home Economics convention in St. Louis, June 23-26, attracted an attendance of 2000 home economists. Featured in the display were AGA home service booklets, the teacher's manual on "Hot Water Magic," and the motion picture, "Winning Seals of Approval." Pictured at the booth are, left to right: Thelma Bell, head of Home Economics Department, Harding College, Seavey, Ark.; Gloria Caupp, AGA Promotion Bureau; Grace Johnson, student, Harding College; Gertrude Austin, American Institute of Baking, Chicago; Clifford E. Hall, AGA Promotion Bureau; and Ruth Soule, home service director, The Brooklyn Union Gas Co.

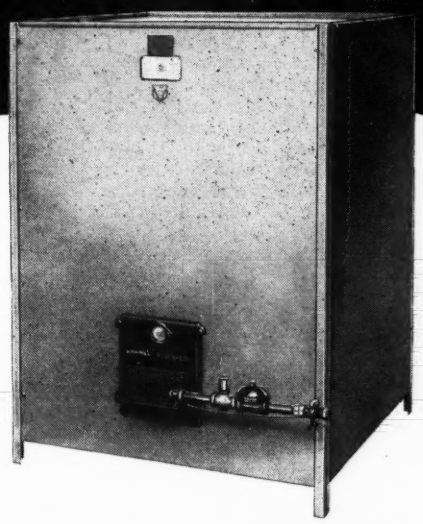
EQUITABLE GAS CO.'s home service department is acting as an "idea scout" to help secure a variety of kitchens and kitchen ideas for "Better Homes and Gardens" magazine. Lois Dinneen, kitchen planning consultant for the company, recently received a check from the magazine for an article on the peninsular "Kalico Kitchen," one of three full-size display kitchens installed in the home service division.

CATALOGS

LESLIE CO., 92 DELAFIELD AVE., LYNDHURST, N. J.—"Self-Cleaning Strainers for Steam, Air, Gas or Liquid Service" is the title of Bulletin 465, an eight-page, two-color, generously illustrated booklet just issued. Strainer screen interchangeability is stressed and standard screen materials are listed for various applications. Tables showing screen specifications and total free hole areas facilitate the selection of the correct screen for different services. Dimensions of cast iron, bronze, steel and stainless steel strainers are shown in tabular form beside line drawings of each type.

THE PYROMETER INSTRUMENT CO., 103 LAFAYETTE ST., NEW YORK, N. Y.—Catalog No. 160 illustrates and describes the new Pyro Surface Pyrometer, an instrument designed especially for the innumerable production and laboratory requirements for a quick and accurate method of determining surface and sub-surface temperatures. Some of the advantages claimed for the device in the four-page, color bulletin are durability, dependability, ease of reading, ruggedness, simplicity of operation, and interchangeability.

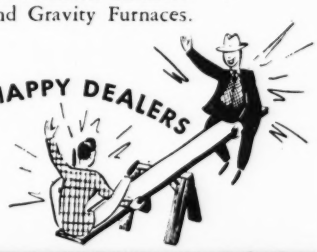
Giving Longer, Better Service Such as Hammel Heaters do... Points the way to Volume Sales And Mounting Profits, too!



Always favorite, because of its ability to keep heating performance UP... operating costs DOWN... that's the Hammel Gravity Furnace ... a new high in *Automatic Gas Heating.*

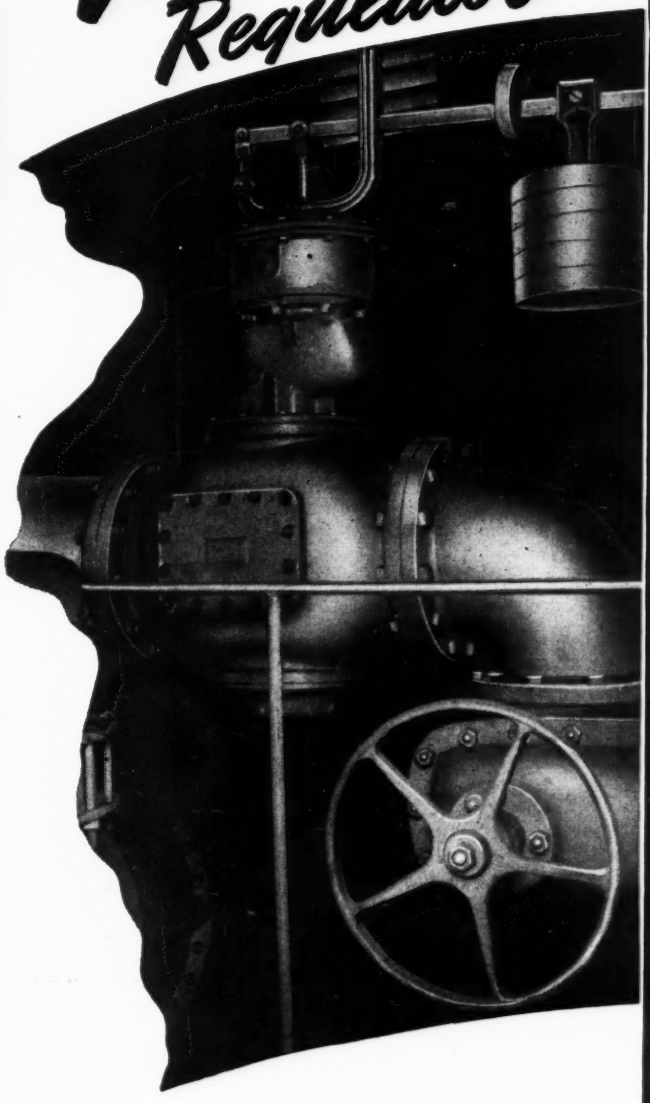
Residences and commercial buildings, in particular are serviced by the gravity furnace with utmost efficiency...either singly or in a battery. For adequate supply of warmth, in room, suite or whole house...this modern furnace does an ideal job. Clean and quiet in operation. Easy to install and to service.

Complete data on special features and new structural specifications will be provided promptly upon receipt of your inquiry. Get the facts on a Hammel Furnace...make bigger heating profits with Hammel Comfortaires, Wall Heaters and Gravity Furnaces.



Hammel
RADIATOR ENGINEERING CO.
A. S. Martinson & Associates
Successors to Hammel Radiator Corp.
SINCE 1912
3348 Motor Ave. Los Angeles 34

Reynolds KT Series Versatile Regulator



★ Reynolds KT Series Versatile Regulator is manufactured in a range of sizes from 2″ to 12″. It will reduce pressure to inches W. C.—or pounds to pounds. This Regulator can be used where space is limited, making it impossible to use the auxiliary bowl. In addition, Reynolds builds High Pressure Line Regulators with auxiliary bowl, when complete lockup is required. Let Reynolds adapt their new Versatile Regulator to your Gas Control System.

Reynolds GAS REGULATOR CO.
ANDERSON INDIANA U.S.A.

HYDROTHERM

AUTOMATIC GAS FIRED
CENTRAL HEATING PLANT

for HOT WATER HEATED HOMES

- LONG-LIFE CAST IRON CONSTRUCTION
- LIGHTWEIGHT, EASY INSTALLATION
- HIGHLY EFFICIENT PATENTED DESIGN
- IDEAL FOR PANEL AND RADIANT HEATING
- APPROVED BY AMERICAN GAS ASSOCIATION
- SPACE-SAVER IN BASEMENT, PLAYROOM

Write for New Booklet G-8

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HOOK & ACKERMAN, Inc., 18 E. 41st ST., N.Y.

THE ANSWER TO YOUR GAS ODORIZING PROBLEMS

Captan *Advantages*

1 Gas-Like Smell
2 Available
3 Volatile
4 Harmless
5 Economical
6 Easy to Handle
7 Uniform
8 Doesn't Fade Out

NATURAL GAS ODORIZING CO., INC.
7620 WALLISVILLE ROAD
HOUSTON, TEXAS

SURFACE COMBUSTION CORP., TOLEDO, OHIO—"Modern Gas Carburizing Processes and Equipment" is said to constitute the most comprehensive compilation published to date on the subject of modern gas carburizing. The bulletin tells how carburizing is accomplished and explains the related processes of suspended carburization, carbon restoration, and dry cyaniding. Applicable prepared atmospheres, their composition, use and method of preparation are described and discussed. The use of the surface radiant tube heating element, the dew point recorder, and controlled atmosphere batch and continuous furnaces, as applied to carburizing processes, are covered. Charts, graphs and tables of an engineering nature, as well as photomicrographs of steel processed by the different heat treatments, add to the value of the booklet as reference material.

DAVEY COMPRESSOR CO., KENT, OHIO—A new bulletin describes Davey Air Chief portable compressors and includes photos and detailed mechanical specifications of 60, 105, 160, 210 and 315 cfm capacity machines. Emphasis is placed on the firm's "Permanent Peak" efficiency valves. The catalog also includes a complete description of the new "Equi-Balanced" crankshaft recently invented by Paul H. Davey, company president. This shaft is claimed to eliminate vibration and rocking and to increase compressor life by 50%.

DRESSER INDUSTRIES, INC., TERMINAL TOWER, CLEVELAND 13, OHIO—"All Along The Line" is the name of a new 111-page bound volume devoted to a discussion of the products and activities of the 14 companies which are teamed together under the name Dresser Industries, Inc. The book is done in two colors and contains dozens of photographs, as well as an index listing products alphabetically.

BURRELL TECHNICAL SUPPLY CO., 1942 FIFTH AVE., PITTSBURGH 19, PA.—The "Announcer" is a quarterly publication presenting and describing scientific laboratory instruments and equipment. Each edition also contains a section devoted to the history of some instrument or process now used in industrial research.

WANTED

A well-qualified man for supervision of Production and Distribution of artificial gas. No managerial or commercial experience necessary. Should be over forty (40) years of age and should have had ten (10) years' practical experience in production and distribution. Box 200, 1709 W. 8th St., Los Angeles 14, Calif.

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We offer 100% coverage as Jobbers and Manufacturers' Agents. LP and Natural Gas - Complete Jobbing Facilities for regular dealer business.

Thoroughly Experienced Specialists for Volume Dealers and Jobbers'

Accounts in: **Louisiana, Mississippi, East Texas, Arkansas, Alabama, and Florida.**

Complete Details on Request

P.O. Box No. 4, New Orleans, Louisiana

RHEEM MANFACTURING CO., 570 LEXINGTON AVE., NEW YORK 22, N. Y.—This firm has issued three new catalogs. RA 40-1, titled "Warm Air Heating, Stokers, Air Conditioning Systems," describes, among other items, gas floor and wall furnaces, console heaters and wall heaters. RA 39-1, "Water Heating and Conditioning Systems, Sewage Disposal Systems, Water Tanks," includes a section on gas water heaters, as well as a chart showing all Rheem appliance products manufactured for the various fuels. "Heating Equipment for Gas, Coal, Oil" is the title of RA154. All three bulletins are illustrated and contain specifications charts.

CONSOLIDATED INDUSTRIES, INC., LAFAYETTE, IND.—"Consolidated Blue Flame Gas Burner" is the title of a catalog describing the conversion type, upfire model gas burner which is claimed to set new standards in compactness of design, maximum heating efficiency, unusual ease of installation, and freedom from service worries. The bulletin includes 19 construction and design features concerning the burner, the air supply, the gas supply, and installation.

CURRENT READING

The Synthesis and Properties of Hydrocarbons of High Molecular Weight —IV—Robert W. Schiessler, C. H. Herr, A. W. Rytina, C. A. Weisel, F. Fischl, R. L. McLaughlin, and H. H. Kuehner. This paper, scheduled for presentation at the 12th Mid-Year Meeting of the Division of Refining, American Petroleum Institute, in St. Louis on June 2, summarizes the research completed between July 1, 1943 and July 1, 1946 by API Research Project 42 at The Pennsylvania State College on the properties of pure hydrocarbons of high molecular weight.

Fifty-five new hydrocarbons ranging from 170 to 547 in molecular weight have been prepared, making a total of 121 pure hydrocarbons of high molecular weight reported by the project since its inception in July, 1940.

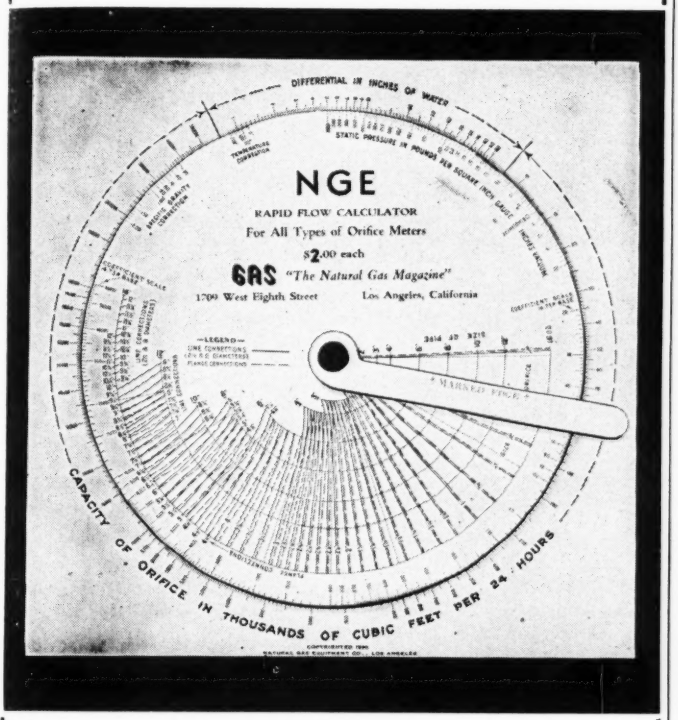
Results on the 13 new binary mixtures of higher hydrocarbons are given. A new method of calculating the viscosity of a mixture of hydrocarbons has been developed and its limitations are discussed. Tentative generalizations regarding the effect of chemical structure on the physical properties of an oil are proposed.

Analysis of a Standard Sample of Natural Gas by Laboratories Cooperating With the American Society for Testing Materials—Martin Shepherd. Report of the analysis of a standard sample of natural gas by 30 laboratories cooperating with the ASTM. Data are presented in a series of frequency distribution plots which show at a glance how the analyses from all laboratories compare with respect to each component determined; calculated heating value and specific gravity determined by analysis are compared with values carefully measured at the National Bureau of Standards. Analyses were performed volumetrically by the absorption and combustion methods, and the plots form a clear picture of this type of gas analysis in this country. Available from the National Bureau of Standards, Washington 25, D. C. Price, 20 cents.

NGE RAPID FLOW

CALCULATOR

FROM 2 inches TO 16 inches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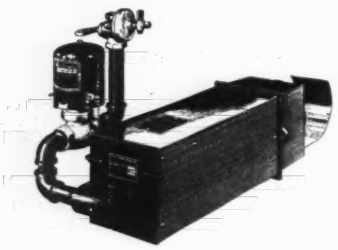

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Manual of Mechanical Joint Cast Iron Pipe and Fittings for the Gas Industry—Cast Iron Pipe Research Association, Peoples Gas Bldg., Chicago 3, Ill. This 88-page, cloth-bound, completely illustrated book is being mailed to gas executives, engineers, superintendents and others directly or indirectly concerned with gas distribution and transmission. It contains weights of pipe, accessories, and dimensions of fittings for standardized mechanical joint cast iron pipe, never before published; page-size photographs of the progressive steps in assembling the standardized mechanical joint; photographs of installations throughout the country in sizes from 2 in. up, for all pressures; and a collection of engineering tables, formulae, and useful hints selected and checked by a gas engineering consultant.

Operational Experience With Gas Interchangeability Problems in City Gas Distribution Systems—Collected by R. B. Paquette, The Peoples Gas Light and Coke Co., Chicago. This booklet records the variations in sendout gas composition of more than 50 operations during the past winter. In addition, some comments on results obtained, description of LP-gas equipment, and plans for expansion of gas production facilities are included. This material was obtained by questionnaire with the thought that it might prove helpful as material supplementary to researches on the interchangeability problem. An attempt was made to include the report of any company indicating expansion plans even though no interchangeability problem was involved.

Tentative Standard Procedure for the Determination of Superexpansibility and Manometer Factors Used in Measurement of Natural Gas by Orifice Meter at Pressures in Excess of 500 Psig — California Natural Gasoline Association, 510 West 6th St., Los Angeles 14, Calif. Under the direction of E. P. Valby, chairman of the technical committee, a joint committee consisting of the CNGA, PCGA and Southern California Meter Association compiled the data for this publication (TS-461) to supplement bulletins TS-353, TS-354 and TS-402. It is felt that this bulletin will fill the need for supplemental superexpansibility factors and manometer factors created by the advent of metering installations measuring gas at pressures in excess of 500 psig.

American Oil Operations Abroad—Leonard M. Fanning. Published by McGraw-Hill Book Co., Inc. Over 250 illustrations are contained in the 382 pages. This book relates how Americans ranged the earth in search of oil, and it reveals the scope of American interests and activities in each country. The extent of our investments, unique problems involved in oil deals with foreign lands, and the outlook for the future in world oil are factually discussed. Price, $5.

The New Labor Law—Published by The Bureau of National Affairs, 24th and N Sts., Washington, D. C. This report represents a complete analysis, includes Congressional interpretation, conference and committee reports, and the text of the Labor-Management Relations Act, 1947. What the act means to business men, workers, unions and their advisors is outlined. Price, $5.